

# CTX 5500

## VHF/FM Marine Radiotelephone

- Full 25 Watt transmit power
- Fully synthesized US and Canadian channels
- Simple keyboard operation
- Outstanding dual-watch channel 16 monitor feature
- Front mounted speaker for clear listening
- Reversible front panel for overhead mounting



## Specifications

### General:

#### Frequency range:

Transmitter: 156.00 – 157.50 MHz

Receiver: 156.00 – 163.00 MHz

#### Number of channels:

Transmitter: All US VHF marine channels

Receiver: All US VHF marine channels  
plus 4 weather channels

#### Supply voltage:

13.6 volts DC negative ground

#### Antenna impedance:

50 ohms

#### Modulation:

16F3

#### Microphone impedance:

600 – 2000 ohms

#### Current drain:

Transmitter H/L: 6.0A/2.5A

Receiver stby/rated: 0.6/1.5A

#### Temperature range:

–20°C to +50°C

#### FCC:

Part 83 / 15, Part 81 optional.

DOC

#### Dimensions:

9-13/16"W x 3-3/8"H x 12-7/8"D (250 x 84 x 327 mm)

#### Weight:

Approx. 8.6 lbs. (3.9 kg)

### Transmitter:

#### Output power:

25W/1W

#### Deviation:

±5 kHz max. @ 1 kHz

#### Spurious & harmonics:

–70 dB

#### Audio frequency response:

+1, –3 dB, 300 – 3000 Hz

#### Distortion:

5%

### Receiver:

#### Sensitivity:

–12 dB sinad: 0.3  $\mu$ V

20 dB quieting: 0.35  $\mu$ V

#### Squelch sensitivity:

Threshold: 10 dB noise quieting

Tight: 2  $\mu$ V

#### Modulation acceptance bandwidth:

±7 kHz

#### Spurious & image rejection:

–70 dB

#### Intermodulation rejection:

–70 dB

#### Selectivity:

–70 dB

#### Hum & noise:

–50 dB

#### Audio frequency response:

+1, –8 dB, 300 – 3000 Hz

#### Audio output 10% THD 4 ohms:

5 watts



## General Description

### CTX 5500 VHF/FM Radiotelephone

Fully synthesized, the CTX 5500 is designed to meet the requirements for simple operation, yet incorporates all the capabilities of a full function keyboard VHF/FM radiotelephone. The microprocessor synthesizer has been engineered to make available all U.S. and Canadian channels. Ideally suited for the application where flexibility in channels is mandatory. The CTX 5500 is manufactured to exacting specifications that assure performance and reliability in the harsh marine environment.

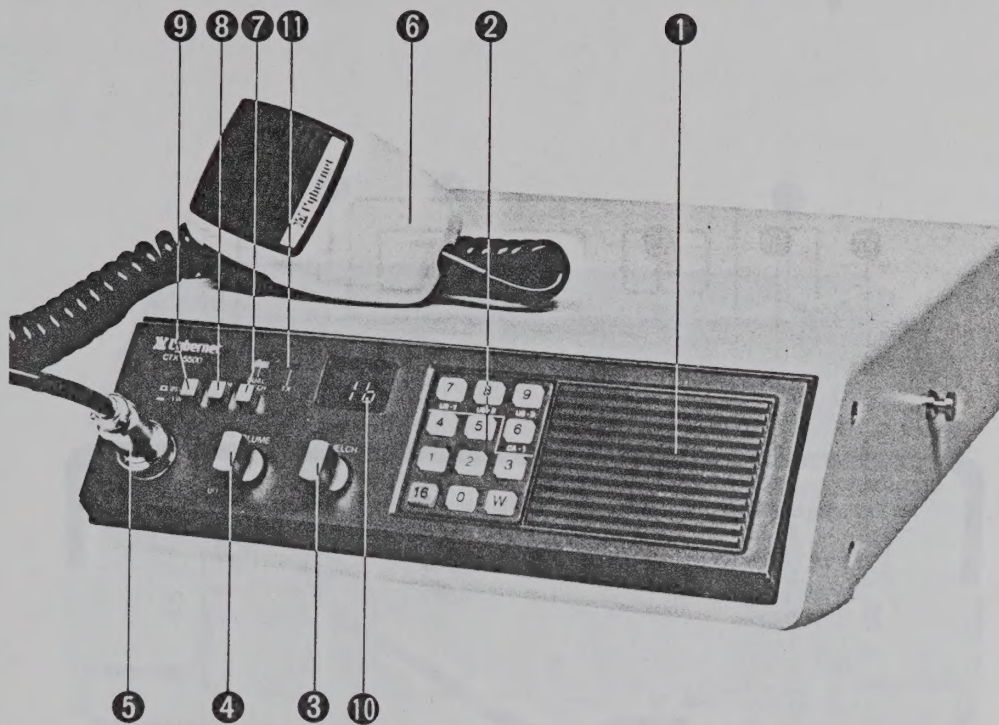
The transmitter section of the radiotelephone has been designed to exceed the requirement of intermittent marine service, which is defined as a 50% duty cycle to 2 minutes transmitting followed by a period of 2 minutes receiving. Operating the transmitter within these limits will assure long trouble-free service.

A convenient mounting 'tray' system provides easy mounting under virtually any conditions desired and permits quick removal for servicing.

Before operating the CTX 5500 you must obtain your license. Transmitting without the appropriate license is illegal. The license can be obtained by submitting completed FCC forms 506 and 753 to the Federal Communications Commissions. Furthermore, you are required to read and understand Part 81 and 83 of the FCC rules and regulations prior to operation of this radiotelephone. It is the user's responsibility to see that this radiotelephone is operating at all times in accordance with the FCC rules and regulations. For servicing we recommend that you consult with the dealer from which you purchased the radiotelephone, since you are prohibited by the FCC to adjust the transmitter circuit of the unit unless you hold a current First or Second Class Radiotelephone License. A citizens band or amateur license is not sufficient.

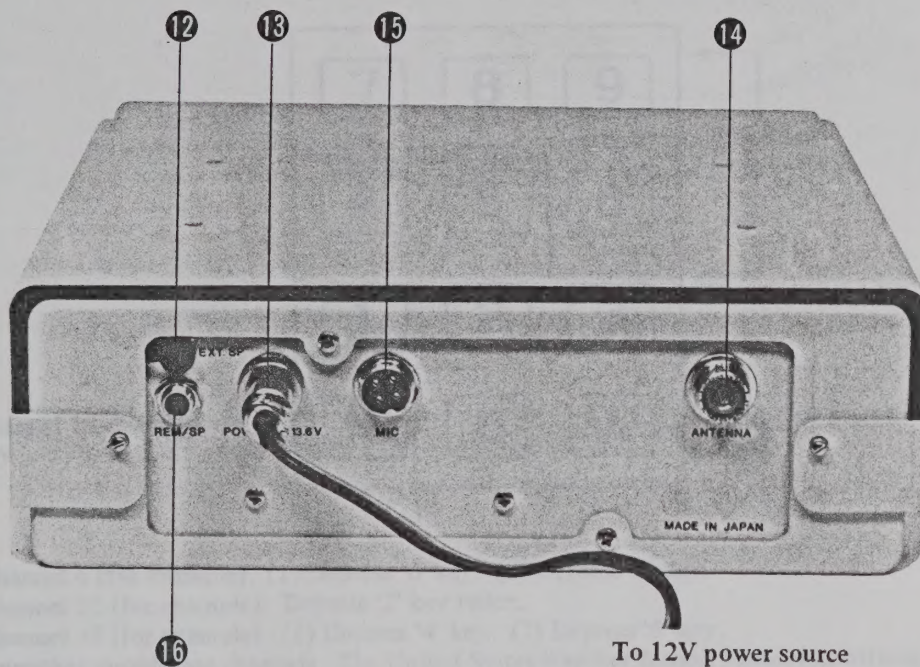


## Operating Controls



- ① **Speaker.** Built-in, front mounted speaker.
- ② **Channel selector keyboard.** Selects a channel directly. See Keyboard Operation section for details.
- ③ **Squelch control.** This quiets the receiver section when signals are not being received and thus allows quiet standby operation. Starting at the fully counterclockwise position (minimum squelch), rotate the squelch control clockwise until the receiver is just quieted when no signal is being received. Incoming signals will automatically release the squelch and be heard. Careful adjustment is necessary, since setting the control too far clockwise will not allow weaker signals to overcome the squelch action.
- ④ **Off/Volume control.** This turns the power on and controls the sound output from the built-in speaker. To switch the unit off, rotate the control fully counter-clockwise.
- ⑤ **Microphone connector.** This is used for connection of the microphone which is supplied with this radiotelephone.
- ⑥ **Microphone.** With push-to-talk bar at the side.
- ⑦ **Channel 16 auto monitoring (Dual Watch) button.** Setting this switch on (depressed) will let the receiver start continuous switching between the main channel (selected on the keyboard) and channel 16, until a signal is actually received on channel 16. The lamp located above the button serves to indicate whether a transmission is on the channel 16 during the auto monitoring mode.
- ⑧ **Dim control button.** Permits to select the brilliance of the channel readout. Depress the button to reduce the brilliance for nighttime operation, etc.
- ⑨ **Transmit power selector (25W/1W).** Selects either 25W or 1W transmit power. With the button in the released position, the radiotelephone will produce full rated transmitting power for longer communication range. The depressed position of the button will produce 1W for short range communications.
- ⑩ **LED channel readout.** Shows the channel selected.
- ⑪ **Transmit indicator.** Illuminates when transmitting.





## Rear Panel Connectors

- 12 External speaker jack.** This jack is used for an external speaker (or horn). Insertion of the speaker plug (standard 1/8" 'phone' plug) in this jack automatically silences the built-in speaker.  
**Note.** A protective rubber seal cap is installed over this jack. Do not remove it unless you are using the jack.
- 13 13.6V power connector.** DC power to operate the unit is fed through this connector using the DC power cables supplied. The connector has a locating key and allows the power plug inserted in only one way. Align the key onto the connector and do not force it.
- 14 SO-239 antenna connector.** Accepts a PL-259 antenna connector. The cable from an antenna should be terminated with this type of 50 Ohm connector.
- 15 Microphone connector.** This connector is wired in parallel with another microphone connector on the front panel and accepts plug from an optional telephone type handset.
- 16 Remote speaker jack.** Used for connection of the audio plug from telephone type handset cradle (available optionally from your local Cybernet dealer). Switching between the speaker in handset and the one built-in can be made from the cradle.

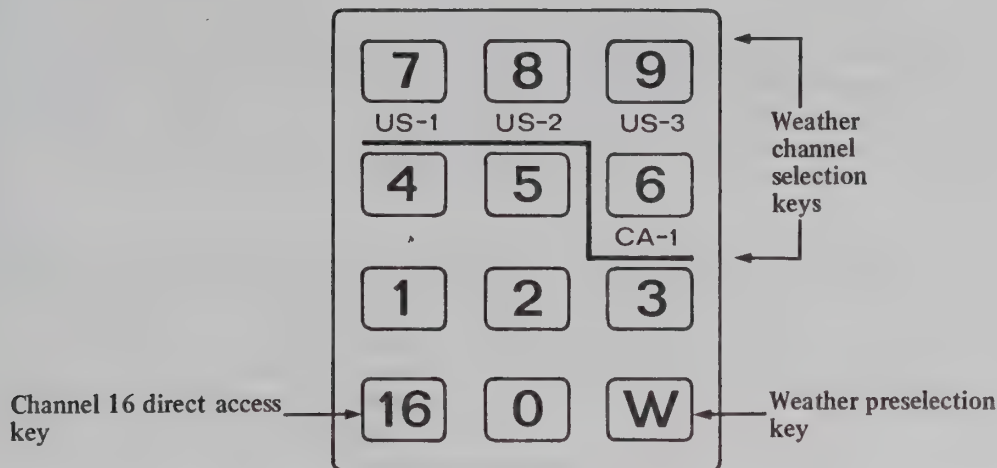


## Operation

**Keyboard operation.** The keyboard consists of digit keys of '0' to '9', priority key of channel 16 and weather preselection key 'W', and enables you to select desired channels in the same manner as ordinary keyboard type telephones.

**To select channel 16 (distress).** Simply depress the '16' key.

**Note.** When the radiotelephone is first switched on (after plugged to 12V DC), the radiotelephone will automatically set to channel 16.



**To select channel 6 (for example).** (1) Depress '0' key. (2) Depress '6' key.

**To select channel 22 (for example).** Depress '2' key twice.

**To select channel 45 (for example).** (1) Depress '4' key. (2) Depress '5' key.

**To receive weather monitoring channels.** The United States Weather Bureau broadcasts official weather conditions from certain locations on various frequencies. This transceiver is capable of receiving these transmissions, including the Canadian weather broadcast service (CA-1). Consult your local weather bureau office for further information concerning these services.

(1) Depress 'W' key. The channel readout should now start flickering (indicating the previous channel). This is the sign to accept weather channel selection. (2) Depress the desired weather monitoring channel key (US-1, US-2, US-3, or CA-1) on the key '7', '8', '9', or '6'.

**Note.** Be sure to press weather channel key within 3 seconds, but if you have failed to do so simply depress 'W' key again.

| Weather channel    | Broadcaster      | Channel readout |
|--------------------|------------------|-----------------|
| US-1 (162.550 MHz) | NOAA             | 'U1'            |
| US-2 (162.400 MHz) | NOAA             | 'U2'            |
| US-3 (162.475 MHz) | NOAA             | 'U3'            |
| CA-1 (161.650 MHz) | Canadian weather | 'C1'            |

### To receive.

Before attempting to operate your radiotelephone, make sure that the antenna is connected to the unit rear antenna connector properly.

- (1) Turn power on by rotating the Volume control.
- (2) Rotate the Squelch control fully counterclockwise.
- (3) Check that the Dual Watch button is in released condition.
- (4) The unit is set to channel 16 automatically, after power switched on. This is the channel you are required to monitor and to make initial radio contact on. The radiotelephone is ready for instant reception or transmission on the selected channel since it does not require a warm-up period.
- (5) Adjust the Volume control for the desired listening level.
- (6) Adjust the Squelch control to a point where the audible hissing noise is just cut off. If some station is transmitting on channel 16, adjust the Squelch control to a point where the speech is clear but the noise between transmissions is cut off.

Do not attempt to transmit on channel 16, if another station is transmitting.



**Auto monitoring ('Dual Watch') operation.** Your radiotelephone incorporates the dual-watch channel 16 monitoring capability, scanning between any channel selected on the keyboard and channel 16. Proceed as follows:

- (1) Set the Dual Watch button released initially.
- (2) Adjust the Squelch control slowly, rotating clockwise until the background noise (no transmissions should be present on the channel) just disappears. This adjustment is essential for correct dual-watch operation.
- (3) Select the desired channel on the keyboard, which you want to dual-watch with channel 16. The channel readout shows the main channel (selected on the keyboard) regardless of the signal existence on the channel 16.
- (4) Depress the Dual Watch button in. If a signal is actually received on channel 16 the 'Dual Watch' lamp located above the button starts flickering; or if no signal is present on the channel 16 the 'Dual Watch' lamp merely lights up. In this condition (no signal), the radiotelephone is engaged in continuous scanning between the selected (main) channel and the channel 16, and when a transmission is actually received on channel 16 the radiotelephone stops scanning to listen to channel 16 as long as the transmission stays.
- (5) For normal operation, reset the Dual Watch button.

**To transmit.**

- (1) Monitor channel 16 to be sure the channel is clear before operating your transmitter.
- (2) Depress the microphone transmit switch and talk into the microphone holding it about 5" to your mouth. The red transmit lamp will go on when the microphone transmit switch is pressed.

**Important.** When the unit is in the 'Dual watch' mode pressing the microphone transmit switch will cause the unit to transmit on the main channel (selected on the keyboard) and **not** on channel 16. To transmit on channel 16 be sure to set the Dual Watch button released.

- (3) To receive, release the transmit switch.

**Note.** During transmission the keyboard entry is impossible.

## **Important Operating Notes**

Listen to a channel before transmitting on it. You may be interrupting important communication.

Always identify your boat by giving its call sign and name at the beginning and end of each message.

Keep a log book of all distress, emergency, navigation, and safety type of information. Note the date, time, call letters and names of all ships involved and the content of the message. The log book should be signed by the person making entries.

It is against the law to use profane or obscene language on the radio. Remember, you're transmitting on a party line.



## Installation

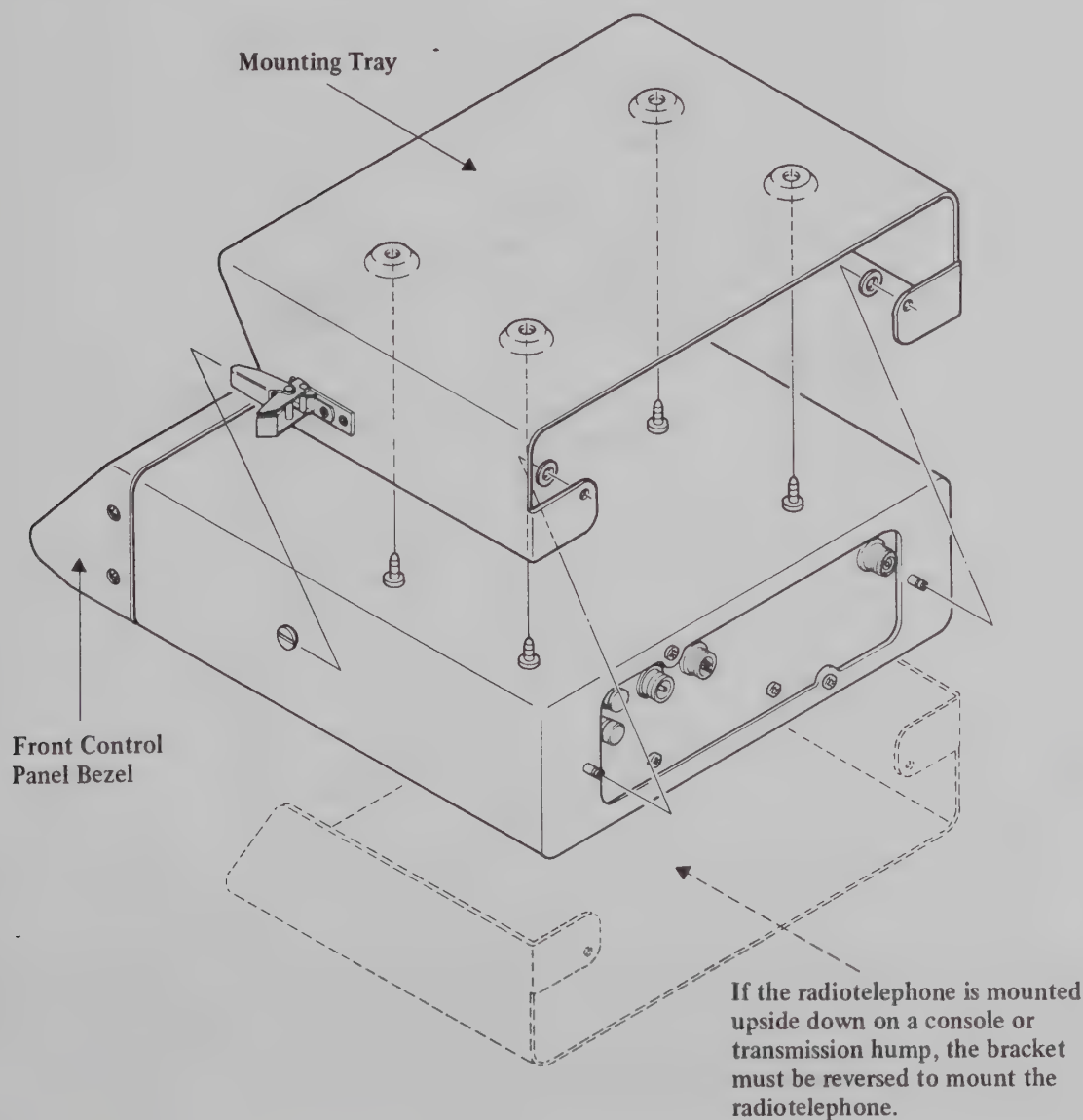
**Location.** Before installing the radiotelephone, choose a location which is protected from moisture and excessive heat. Although built for marine service, the unit must be protected from direct exposure to the elements. Make sure the location chosen is one in which it is convenient to operate the unit. Also bear in mind that the microphone bracket will have to be mounted in the same general area. In ships where more than one operating position is provided, one may be open the weather (flying bridge, cockpit, etc.), it is recommended that the unit is normally kept in the more sheltered position.

**Mounting-Tray.** The radiotelephone may be mounted to the underside of the instrument panel or dashboard of a boat, car, etc. by means of a special mounting tray supplied with the radiotelephone. Attach the bracket to the location selected using four screws supplied.

**Radiotelephone installation to the tray.** Grasp the radiotelephone and insert the rear of the radiotelephone as shown. Gently push the radiotelephone backward so that the guide-pins on the rear of the radiotelephone mate with holes on the tray. Do not force it.

Engage the snap fasteners to the metal lugs on both sides of the radiotelephone. Push the fastener latch to fix the radiotelephone securely. When removing the radiotelephone from the tray, use reverse manner.

**Overhead mounting.** If you want to mount the radiotelephone overhead on the cockpit ceiling, etc. the mounting tray should be mounted up side down on the ceiling. The front control panel bezel will also have to be reversed downward for an operating convenience. Ask your local Cybernet dealer for professional service.





## Power Connection

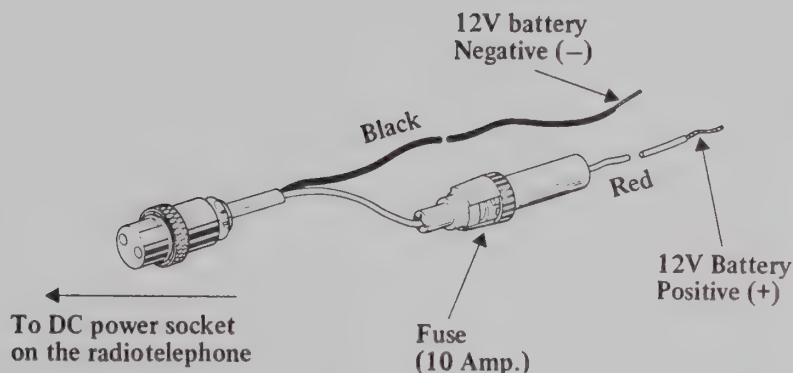
**Important:** This unit is designed for operation from 12-Volt negative ground electrical system. Do not attempt to use it in a positive ground system.

The DC power cable supplied is used to make the necessary DC voltage connections to boat's battery line. Choose a point which is capable of handling at least 6 amps (never use a lighting circuit, for example). The switched side of the ignition switch is usually a suitable point for the **positive (+)** 12 volt connection. Neatly run the power cable leads to this location. If you must extend the power leads, keep the wiring as short as possible, since long wires can cause a voltage drop which will affect the performance of the radiotelephone. Use #10 wire for extensions up to 10 feet and #8 wire for longer extensions.

Connect the **red** (fused) lead to the positive (+) battery line, and the black wire to the hull ground (**battery -**), usually the same as the engine ground. In transceiver installations, the ground system is very important and has a great effect on communication range.

Reverse battery connections (reversing battery polarity) will automatically actuate the protection circuit in the unit and cause the fuse to blow, thus protecting the unit from damage. If the fuse blows, turn the power switch off and check reverse battery connection. Replace the fuse with one having **10A** rating, since any fuses higher than this value may cause damage to the radiotelephone.

The other end of the DC power cable is terminated with a screw-in type 2-pin plug. Always line up the keyway properly before pushing the power cable connector into the transceiver socket. Do not attempt to force the connector; when properly lined up, the connector can be inserted easily. Rotate the screw-ring on the plug to secure it to the socket.



## Antenna Connection

Use a VHF marine antenna which meets the 50 ohm termination requirements. It should be mounted as high as possible for maximum range. Connect it to the antenna connector on the rear panel of the radiotelephone, using 50 ohm coaxial cable with a **PL-259** connector.

Since there are a large number of VHF marine antennas available, you should consult the dealer from whom you purchased the unit for further information on marine antennas that meet your specific needs.



## Base Installation

**Power Connection.** The radiotelephone may be operated from 105 – 120V, 50/60 Hz AC when used with any AC power supply unit which meets the voltage and current requirements of the unit (13.6V DC, 6A or higher).

Simply connect the **red** lead in the unit's power cable to the **positive** DC terminal of the AC power supply unit and the **black** wire to the **negative** terminal.

**Base Station Antenna.** The base station antenna should be as high as possible, FCC Rules and Regulations permitting. Local ordinances dealing with antenna height should be checked before antenna installation. Base station antennas should be of a high-gain type, exhibiting a low angle of radiation. This type of antenna provides gains of up to 12-dB which is equal to increasing the effective transmit power output several times. High gain antennas also increase the strength of the received signal by an equal ratio as previously. At VHF frequencies, the antenna height is a most significant factor in determining communication range.



COMPREHENSIVE VHF-FM MARINE RADIO TELEPHONE CHANNELS . . . by Designator

| OPERATING<br>CHANNEL DESIGNATIONS |                 | FREQUENCY (MHz) |          | TYPE OF TRAFFIC          | FUNCTION          |                   |
|-----------------------------------|-----------------|-----------------|----------|--------------------------|-------------------|-------------------|
| ORIGINAL                          | ADDITIONAL      | SHIP TX         | COAST TX |                          | SHIP/SHIP         | SHIP/ShORE        |
| 1                                 |                 | 156.05          | 160.65   | International Only       | —                 | Yes               |
| 2                                 |                 | 156.1           | 160.7    | International Only       | —                 | Yes               |
| 3                                 |                 | 156.15          | 160.75   | International Only       | —                 | Yes               |
| 4                                 |                 | 156.2           | 160.8    | International Only       | —                 | Yes               |
| 5                                 |                 | 156.25          | 160.85   | International Only       | —                 | Yes               |
| 6                                 |                 | 156.3           | —        | SAFETY                   | Yes               | No                |
| 7                                 |                 | 156.35          | 160.95   | International Only       | —                 | Yes               |
| 7A                                |                 | 156.35          | 156.35   | Commercial               | Yes               | Yes               |
| 8                                 |                 | 156.4           | —        | Commercial               | Yes               | No                |
| 9                                 |                 | 156.45          | 156.45   | Commercial               | Yes               | Yes               |
| 9                                 |                 | 156.45          | 156.45   | Non-Commercial           | Yes               | Yes               |
| 10                                |                 | 156.5           | 156.5    | Commercial               | Yes               | Yes               |
| 11                                |                 | 156.55          | 156.55   | Commercial               | Yes               | Yes               |
| 12                                |                 | 156.6           | 156.6    | Port Operations, USCG    | Yes               | Yes               |
| 13                                |                 | 156.65          | 156.65   | Locks, Canals, Pilots    | Yes               | Yes               |
| 14                                |                 | 156.7           | 156.7    | Port Operations, USCG    | Yes               | Yes               |
| 15                                |                 | 156.75          | 156.75   | Environ., Hydrographic   | Ship Receive Only | Ship Receive Only |
| 16                                |                 | 156.8           | 156.8    | DISTRESS CALLING         | Yes               | DISTRESS CALL     |
| 17                                |                 | 156.85          | 156.85   | State Control Restricted | No                | Yes               |
| 18                                |                 | 156.9           | 161.6    | International Only       | Yes               | Yes               |
| 18A                               |                 | 156.9           | 156.9    | Commercial               | Yes               | Yes               |
| 19                                |                 | 156.95          | 161.55   | International Only       | Yes               | Yes               |
| 19A                               |                 | 156.95          | 156.95   | Commercial               | Yes               | Yes               |
| 20                                |                 | 157.0           | 161.6    | Port Operations          | No                | Yes               |
| 21                                |                 | 157.05          | 161.65   | International Only       | —                 | Yes               |
| 21CG                              |                 | 157.05          | 157.05   | USCG Restricted          | Yes               | Yes               |
| 22                                |                 | 157.1           | 161.7    | International Only       | —                 | Yes               |
| 22CG                              |                 | 157.1           | 157.1    | USCG Restricted          | Yes               | Yes               |
| 23                                |                 | 157.15          | 161.75   | International Only       | —                 | Yes               |
| 23CG                              |                 | 157.15          | 157.15   | USCG Restricted          | Yes               | Yes               |
| 24                                |                 | 157.2           | 161.8    | Public Corresp.          | No                | Yes               |
| 25                                |                 | 157.25          | 161.85   | Public Corresp.          | No                | Yes               |
| 26                                |                 | 157.3           | 161.9    | Public Corresp.          | No                | Yes               |
| 27                                |                 | 157.35          | 161.95   | Public Corresp.          | No                | Yes               |
| 28                                |                 | 157.4           | 162.0    | Public Corresp.          | No                | Yes               |
|                                   | 60              | 156.025         | 160.625  | International Only       | Ship Receive Only | Ship Receive Only |
|                                   | 61              | 156.075         | 160.675  | International Only       | "                 | "                 |
|                                   | 62              | 156.125         | 160.725  | International Only       | "                 | "                 |
|                                   | 63              | 156.175         | 160.775  | International Only       | "                 | "                 |
|                                   | 64              | 156.225         | 160.825  | International Only       | "                 | "                 |
|                                   | 65              | 156.275         | 160.875  | International Only       | Yes               | Yes               |
|                                   | 65A             | 156.275         | 156.275  | Port Operations          | Yes               | Yes               |
|                                   | 66              | 156.325         | 160.925  | International Only       | Yes               | Yes               |
|                                   | 66A             | 156.325         | 156.325  | Port Operations          | Yes               | Yes               |
|                                   | 67              | 156.375         | —        | Commercial               | Yes               | No                |
|                                   | 68              | 156.425         | 156.425  | Non-Commercial           | Yes               | Yes               |
|                                   | 69              | 156.475         | 156.475  | Non-Commercial           | Yes               | Yes               |
|                                   | 70              | 156.525         | —        | Non-Commercial           | Yes               | No                |
|                                   | 71              | 156.575         | 156.575  | Non-Commercial           | Yes               | Yes               |
|                                   | 72              | 156.625         | —        | Non-Commercial           | Yes               | No                |
|                                   | 73              | 156.675         | 156.675  | Port Operations          | Yes               | Yes               |
|                                   | 74              | 156.725         | 156.725  | Port Operations          | Yes               | Yes               |
|                                   | 75              | GUARD CHANNEL   |          | —                        | —                 | —                 |
|                                   | 76              | GUARD CHANNEL   |          | —                        | —                 | —                 |
|                                   | 77              | 156.875         | —        | Commercial               | Yes               | No                |
|                                   | 78              | 156.925         | 161.525  | International Only       | Yes               | Yes               |
|                                   | 78A             | 156.925         | 156.925  | Non-Commercial Only      | No                | Yes               |
|                                   | 79              | 156.975         | 161.575  | International Only       | Yes               | Yes               |
|                                   | 79A             | 156.975         | 156.975  | Commercial               | Yes               | Yes               |
|                                   | 80              | 157.025         | 161.625  | International Only       | Yes               | Yes               |
|                                   | 80A             | 157.025         | 157.025  | Commercial               | —                 | Yes               |
|                                   | 81              | 157.075         | 161.675  | International Only       | —                 | Yes               |
|                                   | 82              | 157.125         | 161.725  | International Only       | —                 | Yes               |
|                                   | 83              | 157.175         | 161.775  | International Only       | —                 | Yes               |
|                                   | 83CG            | 157.175         | 157.175  | USCG Aux. Only           | Yes               | Yes               |
|                                   | 84              | 157.225         | 161.825  | Public Corresp.          | No                | Yes               |
|                                   | 85              | 157.275         | 161.875  | Public Corresp.          | No                | Yes               |
|                                   | 86              | 157.325         | 161.925  | Public Corresp.          | No                | Yes               |
|                                   | 87              | 157.375         | 161.975  | Public Corresp.          | No                | Yes               |
|                                   | 88              | 157.425         | 162.025  | International Only       | Yes               | Yes               |
|                                   | 88A             | 157.425         | —        | Commercial               | Yes               | No                |
| WE <sub>1</sub>                   |                 | —               | 162.55   | NOAA Weather             | Ship Receive Only | Ship Receive Only |
|                                   | WE <sub>2</sub> | —               | 162.4    | NOAA Weather             | "                 | "                 |
| WE <sub>3</sub>                   |                 | —               | 162.475  | "                        | "                 | "                 |
|                                   | WE <sub>4</sub> | —               | 161.650  | "                        | "                 | "                 |

Check locally for Channels Authorized or used in your Area.



## USA VHF-FM MARINE RADIODTELEPHONE CHANNELS . . . by Function

| OPERATING CHANNEL DESIGNATORS |                 | FREQUENCY (MHz) |         | POINTS OF COMMUNICATION | TYPE OF TRAFFIC                |
|-------------------------------|-----------------|-----------------|---------|-------------------------|--------------------------------|
| ORIGINAL                      | ADDITIONAL      | SHIP TX         | COST TX |                         |                                |
| DISTRESS, SAFETY AND CALLING  |                 |                 |         |                         |                                |
| 16                            |                 | 156.8           | 156.8   | Ship/Ship, Ship/Shore   | DISTRESS CALLING               |
| INTERSHIP SAFETY              |                 |                 |         |                         |                                |
| 6                             |                 | 156.3           | 156.3   | Ship/Ship               | SAFETY                         |
| NAVIGATIONAL BRIDGE TO BRIDGE |                 |                 |         |                         |                                |
| 13                            |                 | 156.65          | 156.65  | Ship/Ship, Ship/Shore   | Locks, Canals, Pilots, Bridges |
| ENVIRONMENTAL                 |                 |                 |         |                         |                                |
| 15                            |                 | —               | 156.75  | Shore to Ship, Rev Only | Environ., Hydrographic         |
| STATE CONTROL                 |                 |                 |         |                         |                                |
| 17                            |                 | 156.85          | 156.85  | Ship/Shore              | RESTRICTED                     |
| PORT OPERATIONS               |                 |                 |         |                         |                                |
| 12                            |                 | 156.6           | 156.6   | Ship/Ship, Ship/Shore   | USCG                           |
| 14                            |                 | 156.7           | 156.7   | "                       | USCG, Port Auth.               |
| 20                            |                 | 157.0           | 161.6   | Ship/Shore Only         | Port Operations, USA           |
|                               | 65A             | 156.275         | 156.275 | Ship/Ship, Ship/Shore   | "                              |
|                               | 66A             | 156.326         | 156.325 | "                       | "                              |
|                               | 73              | 156.675         | 156.675 | "                       | "                              |
|                               | 74              | 156.725         | 156.725 | "                       | "                              |
| COMMERCIAL                    |                 |                 |         |                         |                                |
| 7A                            |                 | 156.35          | 156.35  | Ship/Ship, Ship/Shore   | Commercial, USA                |
| 8                             |                 | 156.4           | —       | Ship/Ship Only          | "                              |
| 9                             |                 | 156.45          | 156.45  | Ship/Ship, Ship/Shore   | "                              |
| 10                            |                 | 156.5           | 156.5   | "                       | "                              |
| 11                            |                 | 156.55          | 156.55  | "                       | "                              |
| 18A                           |                 | 156.9           | 156.9   | "                       | "                              |
| 19A                           |                 | 156.95          | 156.95  | "                       | "                              |
|                               | 67              | 156.375         | —       | Ship/Ship Only          | Work boats                     |
|                               | 77              | 156.875         | —       | "                       | Commercial, USA                |
|                               | 79A             | 156.975         | 156.975 | Ship/Ship, Ship/Shore   | "                              |
|                               | 80A             | 157.025         | 157.025 | "                       | "                              |
|                               | 88A             | 157.425         | —       | Ship/Ship Only          | Fishing Vessels                |
| NON-COMMERCIAL                |                 |                 |         |                         |                                |
| 9                             |                 | 156.45          | 156.45  | Ship/Ship, Ship/Shore   | Clubs, Marinas, Yards, etc.    |
|                               | 68              | 156.425         | 156.425 | Ship/Ship, Ship/Shore   | Yachts                         |
|                               | 69              | 156.475         | 156.475 | Ship/Ship, Ship/Shore   | Clubs, Marinas, Yards, etc.    |
|                               | 70              | 156.525         | —       | Ship/Ship Only          | Yachts                         |
|                               | 71              | 156.575         | 156.575 | Ship/Ship, Ship/Shore   | Clubs, Marinas, Yards, etc.    |
|                               | 72              | 156.625         | —       | Ship/Ship Only          | Yachts                         |
|                               | 78A             | 156.925         | 156.925 | Ship/Shore Only         | Clubs, Marinas, Yards, etc.    |
|                               | 83CG            | 157.175         | 157.175 | Ship/Ship, Ship/Shore   | USCG Aux. Only                 |
| PUBLIC CORRESPONDENCE         |                 |                 |         |                         |                                |
| 24                            |                 | 157.2           | 161.8   | Ship/Public Coast       | Telephone Corresp.             |
| 25                            |                 | 157.25          | 161.85  | "                       | "                              |
| 26                            |                 | 157.3           | 161.9   | "                       | "                              |
| 27                            |                 | 157.35          | 161.95  | "                       | "                              |
| 28                            |                 | 157.4           | 162.0   | "                       | "                              |
|                               | 84              | 157.225         | 161.825 | "                       | "                              |
|                               | 85              | 157.275         | 161.875 | "                       | "                              |
|                               | 86              | 157.325         | 161.925 | "                       | "                              |
|                               | 87              | 157.375         | 161.975 | "                       | "                              |
| NOAA WEATHER SERVICE          |                 |                 |         |                         |                                |
| WE <sub>1</sub>               | WE <sub>2</sub> | —               | 162.55  | Ship Receive Only       | Weather Broadcasts             |
|                               |                 | —               | 162.4   | "                       | "                              |
| WE <sub>3</sub>               | WE <sub>4</sub> | —               | 162.475 | Ship Receive Only       | Weather Broadcasts             |
|                               |                 | —               | 162.650 | "                       | "                              |

Check locally for Channels Authorized or used in your Area.



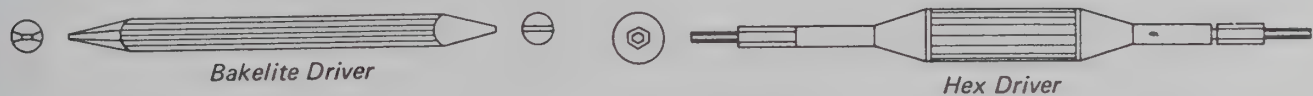
## Alignment Procedure

The **CTX-5500** has been fully aligned at the factory before shipment to you and does not normally require further adjustment. When necessary, however, the unit may be aligned as indicated hereinafter. It is recommended that you do not try to adjust any circuit in this radiotelephone unless you entirely understand circuit operation and have enough experience in this field of marine radiotelephone and high quality test equipment. Since the radiotelephone is most precise and sophisticated, tampering with the unit may cause upsetting the alignment and lowers its performance.

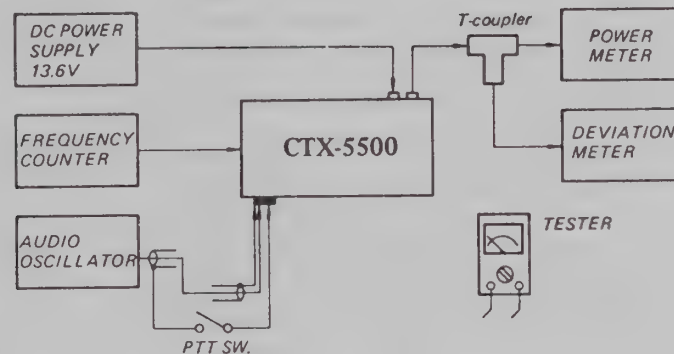
### Equipment Required

Following equipment are required for the alignment.

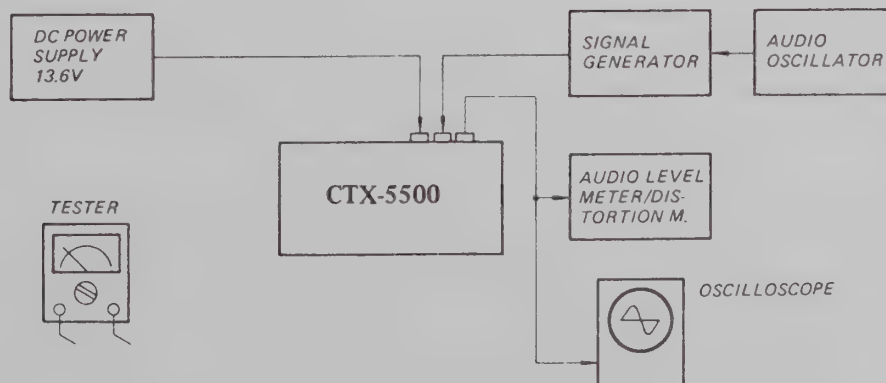
- (1) Regulated DC Power Supply, 0 – 20V, 10A or higher.
- (2) Audio Signal Generator, 10 Hz – 20 kHz.
- (3) RF VTVM, Probe type, 150 MHz.
- (4) Circuit Tester or Digital Voltmeter.
- (5) Frequency Counter, 0 – 250 MHz, high impedance input.
- (6) Deviation Meter.
- (7) Synchroscope.
- (8) RF Dummy Resistor, 50 ohms, 30W.
- (9) RF Power Meter, 50 ohms impedance, 25W or higher.
- (10) T-coupler.
- (11) Drivers, as shown.



### Transmitter Alignment Test Setup.



### Receiver Alignment Test Setup





# PLL Alignment (PTPL003) – TX alignment setup

|   | Adjustment                                                       | Test Point                                                                                  | Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---|------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | VR-2<br>(Squelch)<br><br>T-1<br>(PTVC002)                        | TP-1                                                                                        | <p>a. Before turning power on, check resistance between:<br/>Terminal 1 of Y-4 (–) and ground (+) = 40 kOhm.<br/>Terminal 2 of Y-5 (–) and ground (+) = 80 kOhm.<br/>Terminal 5 of Y-5 (–) and ground (+) = 120 kOhm.</p> <p>b. Temporarily rotate VR-2 fully counterclockwise.<br/>Turn the power on (Select channel 06).<br/>Check voltage between pin No. 2 of U-4 and ground is 9V (<math>\pm 0.4V</math>).</p> <p>c. Check voltage between pin No. 10 of Y-4 and ground is 7.5V (<math>\pm 0.4V</math>).</p> <p>d. Connect tester between TP-1 and ground. Adjust T-1 on VCO PC Board (PTVC002) to obtain 1.5V <math>\pm</math> 0.1V on tester.</p>                                                            |
| 2 | 12.8 MHz<br>Oscillator<br>CT-1<br>T-1 and T-3<br><br>T-2 and T-4 | <p>Pin No. 2 of U-2.</p> <p>Pin No. 5 of U-1.</p> <p>PLL output, Cathode of D-1 or D-2.</p> | <p>a. Connect frequency counter through a probe and 1 pF capacitor between pin No. 2 of U-2 and ground. Turn CT-1 to obtain reading of 12.800000 MHz (<math>\pm 5</math> Hz) on the counter.</p> <p>b. Choose WX1.<br/>Connect synchroscope through the low-capacitance probe between pin No. 5 of U-1 and ground. Adjust T-1 to observe maximum scope display. Next, adjust T-3 to observe maximum scope display. Make sure that the oscillator is displaying clear 'peak-to-peak' wave.</p> <p>c. Choose CH16.<br/>Connect RF VTVM (or synchroscope) between PLL output, cathode of D-1 (or D-2), and ground. Adjust T-2 and T-4 on PLL PC Board (PTPL003) so that maximum 'peak-to-peak' output is observed.</p> |
| 3 | Overall<br>Frequency<br>L-3                                      | PLL output, Cathode of D-2.                                                                 | <p>Connect frequency counter between PLL output, D-2, and ground.<br/>Choose WX1.<br/>Adjust L-3 to obtain reading of 141.150200 MHz (<math>\pm 50</math> Hz).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4 | Deviation<br>RV-1                                                | PLL output, Cathode of D-1.                                                                 | <p>Chose CH16.<br/>Connect deviation meter to VCO output, D-1, and connect signal generator to mic input circuit (pin No. 1 of mic jack J-6) and ground (pin No. 2 of J-6). Apply 1 kHz, 0.1V signal to the mic input circuit. Adjust RV-1 so that 4.5 kHz deviation is obtained on deviation meter.</p>                                                                                                                                                                                                                                                                                                                                                                                                            |
| 5 | VCO Oscillating<br>Range Check<br>T-1                            | Pin No. 5 of U-1/TP-1.                                                                      | <p>Choose CH06.<br/>Connect synchroscope between pin No. 5 of U-1 and ground. Connect frequency counter to vertical input terminals of synchroscope. Connect tester between TP-1 and chassis ground. The counter reading should be 2.725000 MHz (<math>\pm 10</math> Hz). Verify that tester is reading 1.5V. If not, adjust T-1. Next, verify that the frequency reading and tester reading at CH WX1. They should be 8.975000 MHz and 4.5V.</p>                                                                                                                                                                                                                                                                   |



## TX Alignment (PTBM103) – TX alignment setup

|   | Adjustment                                                                                                                                                                       | Test Point                   | Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | (RF Alignment)<br>RV-101, RV-102,<br>CT-101, CT-102,<br>CT-103, CT-104,<br>CT-105, CT-106,<br>T-101, T-102,<br>T-103, T-104,<br>T-105, T-106,<br>and T107<br><br>(Power Adjust.) | TP-101,<br>TP-102,<br>TP-103 | <ol style="list-style-type: none"> <li>Temporarily, set RV-101 and RV-102 in the APC circuit to fully counterclockwise position.</li> <li>Choose CH16.<br/>Set the Hi-Lo power switch to Hi position. Depress the Push-to-talk bar and check that TX lamp lights up.</li> <li>Connect tester between TP-101 and ground.</li> <li>Adjust T-101 through T-105 for maximum voltage reading on tester while transmitting. This should read 1.4 – 1.6V.</li> <li>Connect tester to TP-102 and ground.<br/>Adjust T-106 and T-107 for maximum reading (approx. 0.3V).</li> <li>Connect tester to Q-109 emitter (TP-103).<br/>Adjust CT-103 to obtain maximum reading (approx. 0.25V).</li> <li>Adjust CT-104, CT-105 and CT-106 to obtain maximum power on the RF watt meter (approx. 31W).</li> <li>Adjust RV-102 in the APC circuit to obtain 25W on the RF watt meter. Set the Hi-Lo power switch to Lo position. Adjust RV-101 in the APC circuit to obtain 0.8W on the RF watt meter.</li> </ol> |
| 2 | (Frequency Check)<br>CT-101 and<br>CT-102                                                                                                                                        |                              | <ol style="list-style-type: none"> <li>Perform this step only after completion of PLL circuit alignment.<br/>Choose CH16. Adjust CT-102 to obtain 156.800300 MHz <math>\pm</math> 50 Hz on frequency counter.</li> <li>Choose CH20.<br/>Adjust CT-101 to obtain 157.000300 MHz <math>\pm</math> 50 Hz.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 3 | Modulation<br>Alignment<br>(PTPL003)                                                                                                                                             |                              | Review PLL circuit alignment, Step 4. Verify that the deviation is 4.3 – 5.0 kHz at all of CH06, CH16 and CH28. If necessary, adjust RV1 on PTPL003.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



## RX Alignment (PTBM103) – RX alignment setup

| Step                                           | Adjustment                                                                            | Test Point                         | Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Adjust DC power supply to 13.6V. Turn unit on. |                                                                                       |                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1                                              | Mixer<br>T-206<br><br>T-207<br><br>T-201 through<br>T-205,<br>T-208 through<br>T-210. | TP-204<br><br>TP-201<br><br>TP-202 | a. Choose WX-2. Connect tester to TP-204. Adjust T-206 to maximum (1.5 – 2.5V).<br>b. Connect tester to TP-201. Adjust T-207 to maximum (1.5 – 3V).<br>c. Adjust signal generator to 156.800 MHz 70 dB on CH 16. Connect tester to TP-202. Adjust T-201 through T-205, T-208 through T-210 for maximum. (Adjust generator output level so that tester reads as close to 1.5V, if necessary.)<br>d. Adjust signal generator to 162.400 MHz. Connect tester to TP-202. Adjust generator output to 1.5V on tester reading. Adjust T-205 to maximum.<br>e. Remove generator output.<br>f. Connect tester to TP-202. Adjust T-208, T-209, and T-210 to maximum.<br>g. Check 20 dB-noise-quieting sensitivity is less than 0.5 $\mu$ V at all of 06, 16 and WX-2 channels. |
| 2                                              | Squelch Sensitivity Check                                                             |                                    | Rotate the Squelch control fully clockwise and verify that the squelch opens with signal level more than 0.5 $\mu$ V (up to 2.0 $\mu$ V).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## Test Point Standard Voltage Value

|        | Test Points                                          | Standard Value                        | Tester Range |
|--------|------------------------------------------------------|---------------------------------------|--------------|
| TP-101 | 2nd RF Amp.<br>Q107, 2SC2053<br>emitter.             | 1.5V (1.4 – 1.6V)<br>(At transmit)    | 3V           |
| TP-102 | 1st Pre-Driver<br>Q108, 2SC2053<br>emitter.          | 0.3V (0.28 – 0.34V)<br>(At transmit)  | 1.2V         |
| TP-103 | 2nd Pre-Driver<br>Q109, 2N4427<br>emitter.           | 0.25V (0.24 – 0.27V)<br>(At transmit) | 1.2V         |
| TP-201 | 1st Mixer<br>Q202, 2SK23A<br>source.                 | 1.5 – 3V                              | 3V           |
| TP-202 | Limiter Circuit<br>IC201, $\mu$ PC577H<br>pin No. 5. | 5V                                    | 10V          |
| TP-203 | Discriminator                                        | 0V                                    | 1.2V         |
| TP-204 | Local Amp.<br>output.                                | 1.5 – 2.5V                            | 3V           |



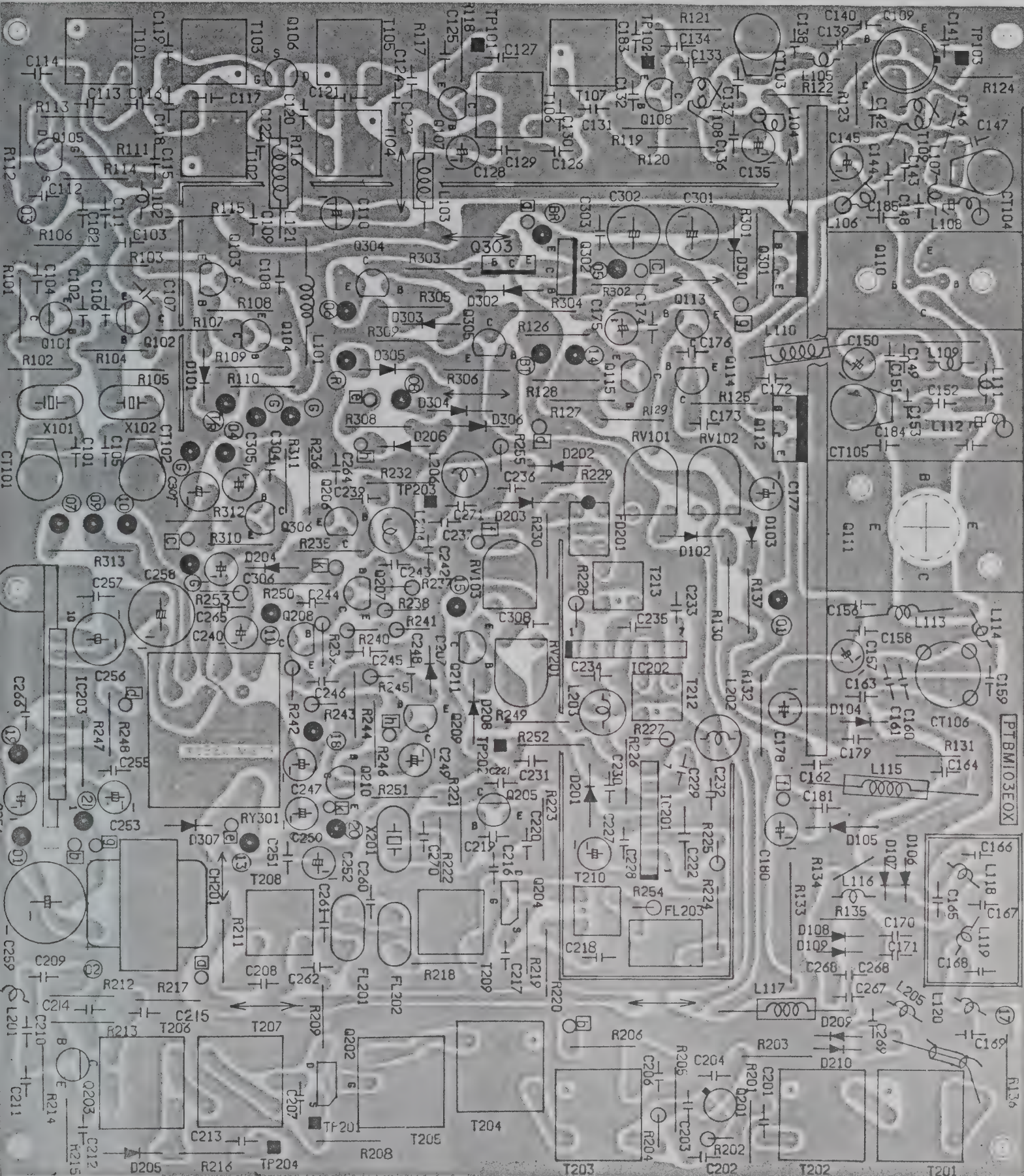
PLL Frequency Table

| Channel | Program Input Code |                |                |                |                |                |                | Programmable Counter Input Code |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 | ÷ N | Input Frequency |
|---------|--------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----|-----------------|
|         | P <sub>6</sub>     | P <sub>5</sub> | P <sub>4</sub> | P <sub>3</sub> | P <sub>2</sub> | P <sub>1</sub> | P <sub>0</sub> | P' <sub>10</sub>                | P' <sub>9</sub> | P' <sub>8</sub> | P' <sub>7</sub> | P' <sub>6</sub> | P' <sub>5</sub> | P' <sub>4</sub> | P' <sub>3</sub> | P' <sub>2</sub> | P' <sub>1</sub> | P' <sub>0</sub> |     |                 |
| 6       |                    | ○              | ○              | ○              | ○              | ○              | ○              | ○                               | ○               | ○               | ○               |                 |                 | ○               |                 |                 | ○               |                 | 109 | 2.725           |
| 7A      |                    | ○              | ○              | ○              | ○              |                | ○              | ○                               | ○               | ○               | ○               |                 |                 | ○               |                 |                 |                 |                 | 111 | 2.775           |
| 8       |                    | ○              | ○              | ○              | ○              |                |                | ○                               | ○               | ○               | ○               |                 |                 |                 | ○               | ○               | ○               |                 | 113 | 2.825           |
| 9       |                    | ○              | ○              | ○              |                | ○              | ○              | ○                               | ○               | ○               | ○               |                 |                 |                 | ○               | ○               |                 |                 | 115 | 2.875           |
| 10      |                    | ○              | ○              | ○              |                | ○              |                | ○                               | ○               | ○               | ○               |                 |                 |                 | ○               |                 | ○               |                 | 117 | 2.925           |
| 11      |                    | ○              | ○              | ○              |                |                | ○              | ○                               | ○               | ○               | ○               |                 |                 |                 | ○               |                 |                 |                 | 119 | 2.975           |
| 12      |                    | ○              | ○              | ○              |                |                |                | ○                               | ○               | ○               | ○               |                 |                 |                 |                 | ○               | ○               |                 | 121 | 3.025           |
| 13      |                    | ○              | ○              |                | ○              | ○              | ○              | ○                               | ○               | ○               | ○               |                 |                 |                 |                 | ○               |                 |                 | 123 | 3.075           |
| 14      |                    | ○              | ○              |                | ○              | ○              |                | ○                               | ○               | ○               | ○               |                 |                 |                 |                 |                 | ○               |                 | 125 | 3.125           |
| 15      |                    | ○              | ○              |                | ○              |                | ○              | ○                               | ○               | ○               | ○               |                 |                 |                 |                 |                 |                 |                 | 127 | 3.175           |
| 16      |                    | ○              | ○              |                | ○              |                |                | ○                               | ○               | ○               |                 | ○               | ○               | ○               | ○               | ○               | ○               |                 | 129 | 3.225           |
| 17      |                    | ○              | ○              |                |                | ○              | ○              | ○                               | ○               | ○               |                 | ○               | ○               | ○               | ○               | ○               |                 |                 | 131 | 3.275           |
| 18A     |                    | ○              | ○              |                |                |                | ○              | ○                               | ○               | ○               |                 | ○               | ○               | ○               | ○               |                 | ○               |                 | 133 | 3.325           |
| 19A     |                    | ○              |                | ○              | ○              | ○              | ○              | ○                               | ○               | ○               |                 | ○               | ○               | ○               | ○               |                 |                 |                 | 135 | 3.375           |
| 20      |                    | ○              |                | ○              | ○              | ○              |                | ○                               | ○               |                 | ○               |                 | ○               | ○               | ○               | ○               | ○               |                 | 321 | 8.025           |
| 21C     |                    | ○              |                | ○              | ○              |                |                | ○                               | ○               | ○               |                 | ○               | ○               | ○               |                 | ○               |                 |                 | 139 | 3.475           |
| 22C     |                    | ○              |                | ○              |                | ○              |                | ○                               | ○               | ○               |                 | ○               | ○               | ○               |                 |                 | ○               |                 | 141 | 3.525           |
| 23C     |                    | ○              |                | ○              |                |                |                | ○                               | ○               | ○               |                 | ○               | ○               | ○               |                 |                 |                 |                 | 143 | 3.575           |
| 24      |                    | ○              |                |                | ○              | ○              | ○              | ○                               | ○               |                 | ○               |                 | ○               | ○               |                 | ○               | ○               |                 | 329 | 8.225           |
| 25      |                    | ○              |                |                | ○              | ○              |                | ○                               | ○               |                 | ○               |                 | ○               | ○               |                 | ○               |                 |                 | 331 | 8.275           |
| 26      |                    | ○              |                |                | ○              |                | ○              | ○                               | ○               |                 | ○               |                 | ○               | ○               |                 |                 | ○               |                 | 333 | 8.325           |
| 27      |                    | ○              |                |                | ○              |                |                | ○                               | ○               |                 | ○               |                 | ○               | ○               |                 |                 |                 |                 | 335 | 8.375           |
| 28      |                    | ○              |                |                |                | ○              | ○              | ○                               | ○               |                 | ○               |                 | ○               |                 | ○               | ○               | ○               |                 | 337 | 8.425           |
| 29      |                    | ○              |                |                |                | ○              |                | ○                               | ○               |                 | ○               |                 | ○               |                 | ○               | ○               |                 |                 | 339 | 8.475           |
| US1     |                    | ○              |                |                |                |                | ○              | ○                               | ○               |                 | ○               |                 |                 | ○               | ○               |                 |                 |                 | 359 | 8.975           |
| US2     |                    | ○              |                |                |                |                |                | ○                               | ○               |                 | ○               |                 |                 | ○               | ○               | ○               | ○               |                 | 353 | 8.825           |
| US3     |                    |                | ○              | ○              | ○              | ○              | ○              | ○                               | ○               |                 | ○               |                 |                 | ○               | ○               |                 | ○               | ○               | 356 | 8.905           |
| CA1     |                    |                | ○              | ○              | ○              | ○              |                | ○                               | ○               |                 | ○               |                 | ○               | ○               | ○               | ○               |                 |                 | 323 | 8.075           |
| 1       |                    |                | ○              | ○              | ○              |                | ○              | ○                               | ○               |                 | ○               | ○               | ○               |                 |                 | ○               |                 |                 | 283 | 7.075           |
| 2       |                    |                | ○              | ○              | ○              |                |                | ○                               | ○               |                 | ○               | ○               | ○               |                 |                 |                 | ○               |                 | 285 | 7.125           |
| 3       |                    |                | ○              | ○              |                | ○              | ○              | ○                               | ○               |                 | ○               | ○               | ○               |                 |                 |                 |                 |                 | 287 | 7.175           |
| 4       |                    |                | ○              | ○              |                | ○              |                | ○                               | ○               |                 | ○               | ○               |                 | ○               | ○               | ○               | ○               |                 | 289 | 7.225           |
| 5       |                    |                | ○              | ○              |                |                | ○              | ○                               | ○               |                 | ○               | ○               |                 | ○               | ○               | ○               |                 |                 | 291 | 7.275           |



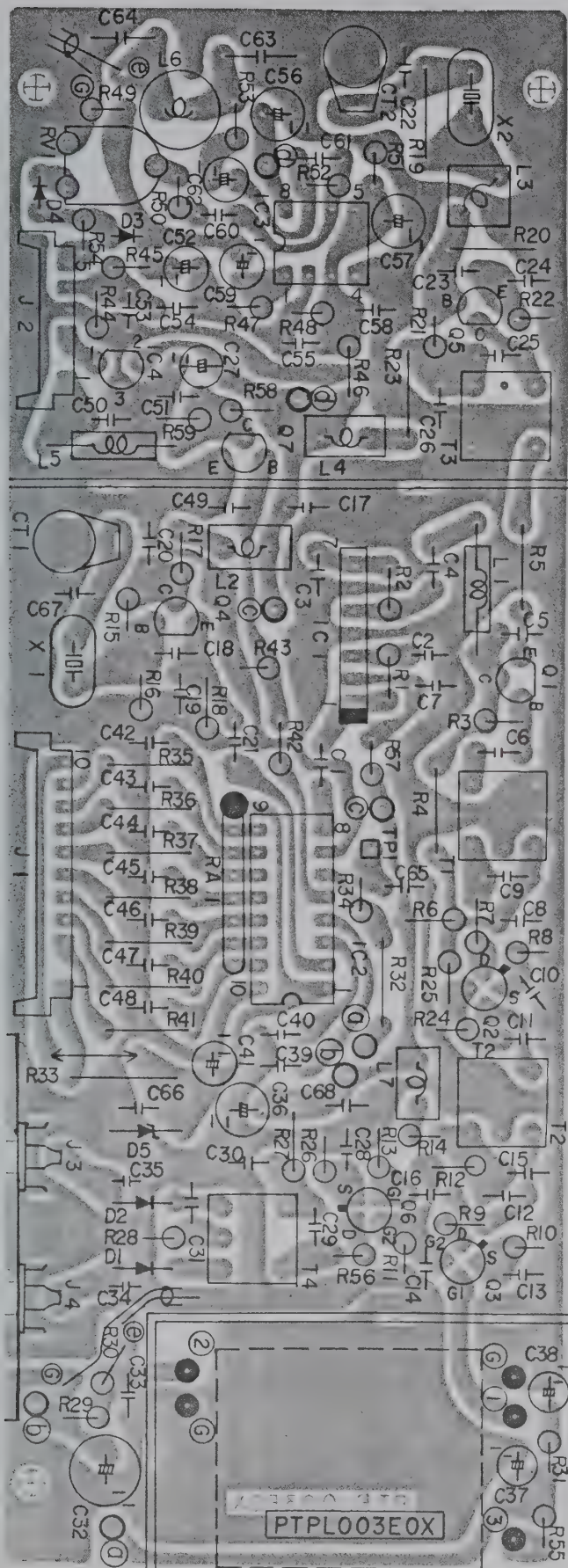
| Channel | Program Input Code |                |                |                |                |                |                | Programmable Counter Input Code |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 | ÷ N | Input Frequency |
|---------|--------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----|-----------------|
|         | P <sub>6</sub>     | P <sub>5</sub> | P <sub>4</sub> | P <sub>3</sub> | P <sub>2</sub> | P <sub>1</sub> | P <sub>0</sub> | P' <sub>10</sub>                | P' <sub>9</sub> | P' <sub>8</sub> | P' <sub>7</sub> | P' <sub>6</sub> | P' <sub>5</sub> | P' <sub>4</sub> | P' <sub>3</sub> | P' <sub>2</sub> | P' <sub>1</sub> | P' <sub>0</sub> |     |                 |
| 65A     | ○                  | ○              | ○              | ○              | ○              | ○              |                | ○                               | ○               | ○               | ○               |                 |                 | ○               |                 |                 | ○               | ○               | 108 | 2.700           |
| 66A     | ○                  | ○              | ○              | ○              | ○              |                |                | ○                               | ○               | ○               | ○               |                 |                 | ○               |                 |                 |                 | ○               | 110 | 2.750           |
| 67      | ○                  | ○              | ○              | ○              |                | ○              | ○              | ○                               | ○               | ○               | ○               |                 |                 |                 | ○               | ○               | ○               | ○               | 112 | 2.800           |
| 68      | ○                  | ○              | ○              | ○              |                | ○              |                | ○                               | ○               | ○               | ○               |                 |                 |                 | ○               | ○               |                 | ○               | 114 | 2.850           |
| 69      | ○                  | ○              | ○              | ○              |                |                | ○              | ○                               | ○               | ○               | ○               |                 |                 |                 | ○               |                 | ○               | ○               | 116 | 2.900           |
| 70      | ○                  | ○              | ○              | ○              |                |                |                | ○                               | ○               | ○               | ○               |                 |                 |                 | ○               |                 |                 | ○               | 118 | 2.950           |
| 71      | ○                  | ○              | ○              |                | ○              | ○              | ○              | ○                               | ○               | ○               | ○               |                 |                 |                 |                 | ○               | ○               | ○               | 120 | 3.000           |
| 72      | ○                  | ○              | ○              |                | ○              | ○              |                | ○                               | ○               | ○               | ○               |                 |                 |                 |                 | ○               |                 | ○               | 122 | 3.050           |
| 73      | ○                  | ○              | ○              |                | ○              |                | ○              | ○                               | ○               | ○               | ○               |                 |                 |                 |                 |                 | ○               | ○               | 124 | 3.100           |
| 74      | ○                  | ○              | ○              |                | ○              |                |                | ○                               | ○               | ○               | ○               |                 |                 |                 |                 |                 |                 | ○               | 126 | 3.150           |
| 75      | ○                  | ○              | ○              |                |                | ○              | ○              | ○                               | ○               | ○               |                 | ○               | ○               | ○               | ○               | ○               | ○               | ○               | 128 | 3.200           |
| 76      | ○                  | ○              | ○              |                |                | ○              |                | ○                               | ○               | ○               |                 | ○               | ○               | ○               | ○               | ○               |                 | ○               | 130 | 3.250           |
| 77      | ○                  | ○              | ○              |                |                |                | ○              | ○                               | ○               | ○               |                 | ○               | ○               | ○               | ○               |                 | ○               | ○               | 132 | 3.300           |
| 78A     | ○                  | ○              |                | ○              | ○              | ○              | ○              | ○                               | ○               | ○               |                 | ○               | ○               | ○               | ○               |                 |                 | ○               | 134 | 3.350           |
| 79A     | ○                  | ○              |                | ○              | ○              |                | ○              | ○                               | ○               | ○               |                 | ○               | ○               | ○               |                 | ○               | ○               | ○               | 136 | 3.400           |
| 80A     | ○                  | ○              |                | ○              |                | ○              | ○              | ○                               | ○               | ○               |                 | ○               | ○               | ○               |                 | ○               |                 | ○               | 138 | 3.450           |
| 82      | ○                  | ○              |                | ○              |                |                | ○              | ○                               | ○               |                 | ○               |                 | ○               | ○               | ○               |                 |                 | ○               | 326 | 8.150           |
| 83C     | ○                  | ○              |                |                | ○              | ○              | ○              | ○                               | ○               | ○               |                 | ○               | ○               |                 | ○               | ○               | ○               | ○               | 144 | 3.600           |
| 84      | ○                  | ○              |                |                | ○              | ○              |                | ○                               | ○               |                 | ○               |                 | ○               | ○               |                 | ○               |                 | ○               | 330 | 8.250           |
| 85      | ○                  | ○              |                |                | ○              |                | ○              | ○                               | ○               |                 | ○               |                 | ○               | ○               |                 |                 | ○               | ○               | 332 | 8.300           |
| 86      | ○                  | ○              |                |                | ○              |                |                | ○                               | ○               |                 | ○               |                 | ○               | ○               |                 |                 |                 | ○               | 334 | 8.350           |
| 87      | ○                  | ○              |                |                |                | ○              | ○              | ○                               | ○               |                 | ○               |                 | ○               |                 | ○               | ○               | ○               | ○               | 336 | 8.400           |
| 88A     | ○                  | ○              |                |                |                |                | ○              | ○                               | ○               | ○               |                 | ○               | ○               |                 |                 | ○               |                 | ○               | 154 | 3.850           |
| 89      | ○                  | ○              |                |                |                |                |                | ○                               | ○               |                 | ○               |                 | ○               |                 | ○               |                 | ○               | ○               | 340 | 8.500           |
| US1     | ○                  |                | ○              | ○              | ○              | ○              | ○              | ○                               | ○               |                 | ○               |                 |                 | ○               | ○               |                 |                 |                 | 359 | 8.975           |
| US2     | ○                  |                | ○              | ○              | ○              | ○              |                | ○                               | ○               |                 | ○               |                 |                 | ○               | ○               | ○               | ○               |                 | 353 | 8.825           |
| 60      | ○                  |                | ○              | ○              | ○              |                | ○              | ○                               | ○               |                 | ○               | ○               | ○               |                 |                 | ○               |                 | ○               | 282 | 7.050           |
| 61      | ○                  |                | ○              | ○              | ○              |                |                | ○                               | ○               |                 | ○               | ○               | ○               |                 |                 |                 | ○               | ○               | 284 | 7.100           |
| 62      | ○                  |                | ○              | ○              |                | ○              | ○              | ○                               | ○               |                 | ○               | ○               | ○               |                 |                 |                 |                 | ○               | 286 | 7.150           |
| 63      | ○                  |                | ○              | ○              |                | ○              |                | ○                               | ○               |                 | ○               | ○               |                 | ○               | ○               | ○               | ○               | ○               | 288 | 7.200           |
| 64      | ○                  |                | ○              | ○              |                |                | ○              | ○                               | ○               |                 | ○               | ○               |                 | ○               | ○               | ○               |                 | ○               | 290 | 7.250           |
| 81C     | ○                  |                | ○              | ○              |                |                |                | ○                               | ○               | ○               |                 | ○               | ○               | ○               |                 |                 | ○               | ○               | 140 | 3.500           |



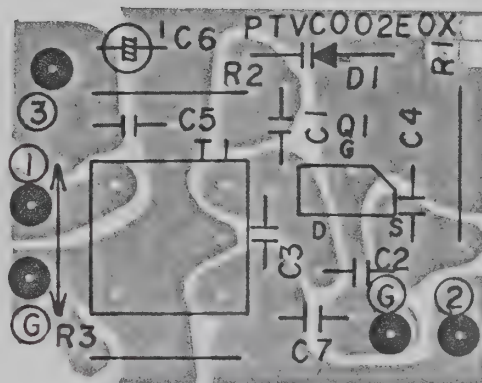




PTPL003



PTVC002









# Replacement Part List

|      |          | PART NAME      | PART CODE    |                  |                |         |      |                               |        |     |     |          |    |
|------|----------|----------------|--------------|------------------|----------------|---------|------|-------------------------------|--------|-----|-----|----------|----|
|      |          | ELEC. ELEMENTS | EMB54AACAL1  |                  |                |         |      |                               |        |     |     |          |    |
| ITEM | REMARKS  | PART CODE      | STOCK NUMBER | PART NAME        | SPECIFICATIONS |         |      | SYMBOLIC OR EXPLODED VIEW NO. |        |     |     | QTY USED |    |
| 1    |          | ACCNC20GEA     |              | CONN. CORD ASSY  |                |         |      | P3                            |        |     |     | 1        |    |
| 2    |          | ACCN165GEA     |              | CONN. CORD ASSY  |                |         |      | P6                            |        |     |     | 1        |    |
| 3    | EXPLODED | APTBM103CA     |              | P.W. BOARD ASSY  |                |         |      |                               |        |     |     | 1        |    |
| 4    | EXPLODED | APTLD275AA     |              | P.W. BOARD ASSY  |                |         |      |                               |        |     |     | 1        |    |
| 5    | EXPLODED | APTPLQ03EA     |              | P.W. BOARD ASSY. |                |         |      |                               |        |     |     | 1        |    |
| 6    | EXPLODED | APTVC022AA     |              | P.W. BOARD ASSY. |                |         |      |                               |        |     |     | 1        |    |
| 7    | EXPLODED | APT7ZC76AA     |              | P.W. BOARD ASSY  |                |         |      |                               |        |     |     | 1        |    |
| 8    |          | CCDE030CCM     |              | CERAMIC CAP.     | CJ             | 3PF     | 500V | -0.25, +0.25PF                | C7     |     |     | 1        |    |
| 9    |          | CCDE120CCM     |              | CERAMIC CAP.     |                | 12PF    | 500V | -10, +10% CH                  | C6     |     |     | 1        |    |
| 10   |          | CKDB103PEM     |              | CERAMIC CAP.     |                | 0.01MFD | 50V  | -0, +100% E                   | C1     | C11 | C12 | C13      | 10 |
| 11   |          |                |              |                  |                |         |      |                               | C14    | C16 | C17 | C19      |    |
| 12   |          |                |              |                  |                |         |      |                               | C8     | C9  |     |          |    |
| 13   |          | CKDE102PEM     |              | CERAMIC CAP.     |                | 1000PF  | 500V | -0, +100% E                   | C15    | C18 | C2  | C3       | 6  |
| 14   |          |                |              |                  |                |         |      |                               | C4     | C5  |     |          |    |
| 15   |          | CQMB104KEH     |              | MYLAR CAPACITOR  |                | 0.1MFD  | 50V  | -10, +10%                     | C10    |     |     |          | 1  |
| 16   |          | GTX5500A03     |              | WIRES KIT        |                |         |      |                               |        |     |     |          | 1  |
| 17   |          | LA1GGC703A     |              | RF COIL          |                |         |      |                               | L1     |     |     |          | 1  |
| 18   |          | MS3258C004     |              | GND. WASHER      |                |         |      |                               |        |     |     |          | 1  |
| 19   |          | QSSSR3AM8E     |              | SI-DIODE         | SR2AM8         |         |      |                               | D1     |     |     |          | 1  |
| 20   |          | RVNA203BC8     |              | VR.              |                |         |      |                               | VR2    |     |     |          | 1  |
| 21   |          | RVNB103A12     |              | VR.              |                |         |      |                               | VR1/S1 |     |     |          | 1  |



[illegible]



|      |         | PART NAME<br>MECH. ELEMENTS | PART CODE<br>FMB54AACAL2 |                       |                     |                               |  |  |  |              |
|------|---------|-----------------------------|--------------------------|-----------------------|---------------------|-------------------------------|--|--|--|--------------|
| ITEM | REMARKS | PART CODE                   | STOCK NUMBER             | CYBERNET<br>PART NAME | SPECIFICATIONS      | SYMBOLIC OR EXPLODED VIEW NO. |  |  |  | Q'TY<br>USED |
| 1    |         | AMTX550001                  |                          | ESCUTCHEON ASSY       |                     |                               |  |  |  | 1            |
| 2    |         | VE86JSX012                  |                          | ESCUICHEON BEZEL      |                     |                               |  |  |  | 1            |
| 3    |         | VW9U2RB004                  |                          | RUBBER SHIELD         | ESCUTCHEON-TO-BEZEL |                               |  |  |  | 1            |
| 4    |         | VN110SP006                  |                          | KNOB, PUSHBUTTON      |                     |                               |  |  |  | 3            |
| 5    |         | VN276SP034                  |                          | KNOB, VOL. SQ.        |                     |                               |  |  |  | 2            |
| 6    |         | MZ683SZ001                  |                          | SIDE CHASSIS          | LEFT                |                               |  |  |  | 1            |
| 7    |         | MZ683SZ002                  |                          | SIDE CHASSIS          | RIGHT               |                               |  |  |  | 1            |
| 8    |         | VB886SX003                  |                          | CABINET CASE          |                     |                               |  |  |  | 1            |
| 9    |         | MB763SN010                  |                          | PLL UNIT CASING       |                     |                               |  |  |  | 1            |
| 10   |         | MU761SN001                  |                          | SHIELD - TOP          |                     |                               |  |  |  | 1            |
| 11   |         | MU761SN002                  |                          | SHIELD - BOTTOM       |                     |                               |  |  |  | 1            |
| 12   |         | MS867AM010                  |                          | REAR PANEL            |                     |                               |  |  |  | 1            |
| 13   |         |                             |                          |                       |                     |                               |  |  |  |              |
| 14   |         |                             |                          |                       | - MISCELLANEOUS -   |                               |  |  |  |              |
| 15   |         | KTTX5000XX                  |                          | OPERATION MANUAL      |                     |                               |  |  |  | 1            |
| 16   |         | KCU00023AX                  |                          | FCC FORM 753          |                     |                               |  |  |  | 1            |
| 17   |         | KZ0U0042XX                  |                          | FCC FORM 506          |                     |                               |  |  |  | 1            |
| 18   |         | KKTX550001                  |                          | CARTON                |                     |                               |  |  |  | 1            |
| 19   |         |                             |                          |                       |                     |                               |  |  |  |              |
| 20   |         |                             |                          |                       |                     |                               |  |  |  |              |
| 21   |         |                             |                          |                       |                     |                               |  |  |  |              |







|      |         | PART NAME       | PART CODE    |                 |                            |       |                    |                               |      |      |           |
|------|---------|-----------------|--------------|-----------------|----------------------------|-------|--------------------|-------------------------------|------|------|-----------|
|      |         | P.W. BOARD ASSY | APTBM103CA   |                 |                            |       |                    |                               |      |      |           |
| ITEM | REMARKS | PART CODE       | STOCK NUMBER | PART NAME       | SPECIFICATIONS             |       |                    | SYMBOLIC OR EXPLODED VIEW NO. |      |      | Q'TY USED |
| 1    |         | RNHCL30N5N      |              | NUT             | M3, S-NI, THIN-TYPE        |       |                    |                               |      |      | 3         |
| 2    |         | BSPB3008MN      |              | BIND HEAD SCREW | (+ )BIT, M3 X 8 S-NI       |       |                    |                               |      |      | 3         |
| 3    |         | BSPB3010NN      |              | BIND HEAD SCREW | (+ )BIT, M3 X 10 S-NI      |       |                    |                               |      |      | 2         |
| 4    |         | BSPC3008NS      |              | CEMS SCREW      | (+ )BIT, M3 X 8 BS-NI      |       |                    |                               |      |      | 1         |
| 5    |         | BSPB3006NT      |              | PAN HEAD SCREW  | (+ )BIT, M3 X 6 PLASTIC    |       |                    |                               |      |      | 2         |
| 6    |         | BSPUB3006MN     |              | THIN BIND SCREW | (+ )BIT, M3 X 6 S-NI       |       |                    |                               |      |      | 1         |
| 7    |         | BWU30655SW      |              | IT. LOCK WASHER | INSIDE TOOTHED, 3 M/M S-ZN |       |                    |                               |      |      | 7         |
| 8    |         | CHD1R104MM      |              | CERAMIC CAP.    | 0.1MFD                     | 12.5V | -20, +20%          | C248                          |      |      | 1         |
| 9    |         | CHD1R204MM      |              | CERAMIC CAP.    | 0.2MFD                     | 12.5V | -20, +20%          | C265                          |      |      | 1         |
| 10   |         | CCDB0R5CAM      |              | CERAMIC CAP.    | AK                         | 0.5PF | 50V -0.25, +0.25PF | C116                          | C118 | C121 | 3         |
| 11   |         | CCDB010CCM      |              | CERAMIC CAP.    | CK                         | 1PF   | 50V -0.25, +0.25PF | C216                          |      |      | 1         |
| 12   |         | CCDB070DPM      |              | CERAMIC CAP.    | PH                         | 7PF   | 50V -0.5, +0.5PF   | C119                          | C126 |      | 2         |
| 13   |         | CCDB100DPM      |              | CERAMIC CAP.    | PH                         | 10PF  | 50V -0.5, +0.5PF   | C113                          |      |      | 1         |
| 14   |         | CCDB101KUM      |              | CERAMIC CAP.    |                            | 100PF | 50V -10, +10% UJ   | C103                          |      |      | 1         |
| 15   |         | CCDB120KPM      |              | CERAMIC CAP.    |                            | 12PF  | 50V -10, +10% PH   | C120                          |      |      | 1         |
| 16   |         | CCDB121KPM      |              | CERAMIC CAP.    |                            | 120PF | 50V -10, +10% PH   | C111                          | C262 |      | 2         |
| 17   |         | CCDB150KPM      |              | CERAMIC CAP.    |                            | 15PF  | 50V -10, +10% PH   | C117                          | C123 |      | 2         |
| 18   |         | CCDB151KUM      |              | CERAMIC CAP.    |                            | 150PF | 50V -10, +10% UJ   | C219                          |      |      | 1         |
| 19   |         | CCDB221KPM      |              | CERAMIC CAP.    |                            | 220PF | 50V -10, +10% PH   | C261                          |      |      | 1         |
| 20   |         | CCDB221KUM      |              | CERAMIC CAP.    |                            | 220PF | 50V -10, +10% UJ   | C102                          | C106 |      | 2         |
| 21   |         | CCDB330KPM      |              | CERAMIC CAP.    |                            | 33PF  | 50V -10, +10% PH   | C101                          | C105 | C201 | 3         |



|      |         | PART NAME       | PART CODE    |              |                |      |                   |                               |      |      |      |          |
|------|---------|-----------------|--------------|--------------|----------------|------|-------------------|-------------------------------|------|------|------|----------|
|      |         | P.W. BOARD ASSY | APTBM103CA   |              |                |      |                   |                               |      |      |      |          |
| ITEM | REMARKS | PART CODE       | STOCK NUMBER | PART NAME    | SPECIFICATIONS |      |                   | SYMBOLIC OR EXPLODED VIEW NO. |      |      |      | QTY USED |
| 1    |         | CCDR470KPM      |              | CERAMIC CAP. | 47PF           | 50V  | -10, +10% PH      | C124                          | C182 | C209 | C210 | 5        |
| 2    |         |                 |              |              |                |      |                   | C211                          |      |      |      |          |
| 3    |         | CCDR510KPM      |              | CERAMIC CAP. | 51PF           | 50V  | -10, +10% PH      | C271                          |      |      |      | 1        |
| 4    |         | CCDR630KCM      |              | CERAMIC CAP. | 68PF           | 50V  | -10, +10% CH      | C112                          |      |      |      | 1        |
| 5    |         | CCDR630KPM      |              | CERAMIC CAP. | 68PF           | 50V  | -10, +10% PH      | C230                          | C244 | C270 |      | 3        |
| 6    |         | CCDR680KUM      |              | CERAMIC CAP. | 68PF           | 50V  | -10, +10% UJ      | C220                          |      |      |      | 1        |
| 7    |         | CCDE0100CM      |              | CERAMIC CAP. |                |      |                   | C130                          |      |      |      | 1        |
| 8    |         | CCDE0400UM      |              | CERAMIC CAP. |                |      |                   | C164                          |      |      |      | 1        |
| 9    |         | CCDE0700CM      |              | CERAMIC CAP. | CH             | 7PF  | 500V -0.5, +0.5PF | C186                          |      |      |      | 1        |
| 10   |         | CCDE080DCM      |              | CERAMIC CAP. |                |      |                   | C160                          | C161 | C268 |      | 3        |
| 11   |         | CCDE1000CM      |              | CERAMIC CAP. | CH             | 10PF | 500V -0.5, +0.5PF | C133                          | C142 |      |      | 2        |
| 12   |         | CCDE120KCM      |              | CERAMIC CAP. | 12PF           | 500V | -10, +10% CH      | C163                          |      |      |      | 1        |
| 13   |         | CCDE120KPM      |              | CERAMIC CAP. | 12PF           | 500V | -10, +10% PH      | C131                          |      |      |      | 1        |
| 14   |         | CCDE150KCM      |              | CERAMIC CAP. | 15PF           | 500V | -10, +10% CH      | C166                          | C267 | C269 |      | 3        |
| 15   |         | CCDE270KCM      |              | CERAMIC CAP. | 27PF           | 500V | -10, +10% CH      | C146                          | C148 | C152 | C159 | 7        |
| 16   |         |                 |              |              |                |      |                   | C167                          | C168 | C169 |      |          |
| 17   |         | CCDE390KPM      |              | CERAMIC CAP. | 39PF           | 500V | -10, +10% PH      | C138                          |      |      |      | 1        |
| 18   |         | CCDE470KCM      |              | CERAMIC CAP. | 47PF           | 500V | -10, +10% CH      | C153                          | C185 |      |      | 2        |
| 19   |         | CCDE470KPM      |              | CERAMIC CAP. |                |      |                   | C132                          |      |      |      | 1        |
| 20   |         | CCDE560KCM      |              | CERAMIC CAP. | 56PF           | 500V | -10, +10% CH      | C184                          |      |      |      | 1        |
| 21   |         | CCDE680KCM      |              | CERAMIC CAP. | 68PF           | 500V | -10, +10% CH      | C137                          | C139 | C154 | C155 | 4        |



|      |         | PART NAME       | PART CODE    |                 |                |     |             |                               |      |      |      |          |
|------|---------|-----------------|--------------|-----------------|----------------|-----|-------------|-------------------------------|------|------|------|----------|
|      |         | P.W. BOARD ASSY | APTBM103CA   |                 |                |     |             |                               |      |      |      |          |
| ITEM | REMARKS | PART CODE       | STOCK NUMBER | PART NAME       | SPECIFICATIONS |     |             | SYMBOLIC OR EXPLODED VIEW NO. |      |      |      | QTY USED |
| 1    |         | CEAC101ZMN      |              | ELYT. CAPACITOR | 100MFD         | 10V | MS          | C311                          |      |      |      | 1        |
| 2    |         | CEAC470ZMN      |              | ELYT. CAPACITOR |                |     |             | C256                          |      |      |      | 1        |
| 3    |         | CEAD100ZMN      |              | ELYT. CAPACITOR | 10MFD          | 16V | MS          | C247                          | C249 | C253 | C254 | 4        |
| 4    |         | CEAD102ALX      |              | ELYT. CAPACITOR | 100CMFD        | 16V |             | C259                          |      |      |      | 1        |
| 5    |         | CEAD220ZMN      |              | ELYT. CAPACITOR | 22MFD          | 16V | MS          | C307                          |      |      |      | 1        |
| 6    |         | CEAD221ALX      |              | ELYT. CAPACITOR | 220MFD         | 16V |             | C258                          |      |      |      | 1        |
| 7    |         | CEAD330ZMN      |              | ELYT. CAPACITOR | 33MFD          | 16V | MS          | C110                          | C252 | C272 |      | 3        |
| 8    |         | CEAD470ZMN      |              | ELYT. CAPACITOR | 47MFD          | 16V | MS          | C301                          | C302 |      |      | 2        |
| 9    |         | CEAE220ZMN      |              | ELYT. CAPACITOR |                |     |             | C178                          |      |      |      | 1        |
| 10   |         | CEAE4R7ZMN      |              | ELYT. CAPACITOR | 4.7MFD         | 25V | MS          | C128                          | C135 | C145 | C150 | 7        |
| 11   |         |                 |              |                 |                |     |             | C157                          | C177 | C227 |      |          |
| 12   |         | CEAG010ZMN      |              | ELYT. CAPACITOR | 1MFD           | 50V | MS          | C250                          |      |      |      | 1        |
| 13   |         | CKDB103KBU      |              | CERAMIC CAP.    | 0.01MFD        | 50V | -10, +10% B | C104                          | C107 | C108 | C109 | 30       |
| 14   |         |                 |              |                 |                |     |             | C122                          | C136 | C162 | C165 |          |
| 15   |         |                 |              |                 |                |     |             | C172                          | C173 | C174 | C176 |          |
| 16   |         |                 |              |                 |                |     |             | C179                          | C183 | C202 | C203 |          |
| 17   |         |                 |              |                 |                |     |             | C204                          | C206 | C207 | C208 |          |
| 18   |         |                 |              |                 |                |     |             | C212                          | C213 | C214 | C215 |          |
| 19   |         |                 |              |                 |                |     |             | C221                          | C251 | C255 | C266 |          |
| 20   |         |                 |              |                 |                |     |             | C303                          | C310 |      |      |          |
| 21   |         | CKDB222KBM      |              | CERAMIC CAP.    | 220CPF         | 50V | -10, +10% B | C114                          | C115 | C125 | C127 | 9        |



|      |         | PART NAME       | PART CODE    | STOCK NO.       |                        |                               |       |       |       |          |
|------|---------|-----------------|--------------|-----------------|------------------------|-------------------------------|-------|-------|-------|----------|
|      |         | P.W. BOARD ASSY | APTBM103CA   |                 |                        |                               |       |       |       |          |
| ITEM | REMARKS | PART CODE       | STOCK NUMBER | PART NAME       | SPECIFICATIONS         | SYMBOLIC OR EXPLODED VIEW NO. |       |       |       | QTY USED |
| 1    |         |                 |              |                 |                        | C129                          |       |       |       |          |
| 2    |         | CKDE222K1M      |              | CERAMIC CAP.    |                        | C134                          | C140  | C141  | C143  | 1        |
| 3    |         |                 |              |                 |                        | C144                          | C149  | C151  | C156  |          |
| 4    |         |                 |              |                 |                        | C158                          | C170  | C171  |       |          |
| 5    |         | CQMB103KEH      |              | MYLAR CAPACITOR | 0.01MFD 50V -10, +10%  | C237                          | C239  |       |       | 2        |
| 6    |         | CQMB104KEH      |              | MYLAR CAPACITOR | 0.1MFD 50V -10, +10%   | C245                          | C257  |       |       | 2        |
| 7    |         | CQMB222KEH      |              | MYLAR CAPACITOR | 2200PF 50V -10, +10%   | C236                          | C242  | C243  |       | 3        |
| 8    |         | CQMB224KEH      |              | MYLAR CAPACITOR | 0.22MFD 50V -10, +10%  | C222                          |       |       |       | 1        |
| 9    |         | CQMB393KEH      |              | MYLAR CAPACITOR | 0.039MFD 50V -10, +10% | C264                          |       |       |       | 1        |
| 10   |         | CQMB472KEH      |              | MYLAR CAPACITOR | 4700PF 50V -10, +10%   | C246                          |       |       |       | 1        |
| 11   |         | CQMB473KEH      |              | MYLAR CAPACITOR | 0.047MFD 50V -10, +10% | C217                          | C218  | C228  | C229  | 9        |
| 12   |         |                 |              |                 |                        | C231                          | C232  | C233  | C234  |          |
| 13   |         |                 |              |                 |                        | C235                          |       |       |       |          |
| 14   |         | CSSFR68MIC      |              | TANTALUM CAP.   | 0.68MFD 35V -20, +20%  | C240                          |       |       |       | 1        |
| 15   |         | CTZ72COK01      |              | TRIMMER CAP.    |                        | CT106                         |       |       |       | 1        |
| 16   |         | CTZ72COK01      |              | TRIMMER CAP.    |                        | CT101                         | CT102 | CT103 | CT104 | 5        |
| 17   |         |                 |              |                 |                        | CT105                         |       |       |       |          |
| 18   |         | FBR455F11M      |              | CERAMIC FILTER  |                        | FL203                         |       |       |       | 1        |
| 19   |         | FF21R4F01M      |              | XTAL FILTER     |                        | FL201                         | FL202 |       |       | 2        |
| 20   |         | FZR455A01M      |              | CERAMIC FILTER  |                        | FD201                         |       |       |       | 1        |
| 21   |         | LA1EFC708A      |              | RF COIL         |                        | L109                          |       |       |       | 1        |



|      |         | PART NAME      | PART CODE    |            |                |                               |      |      |      |           |
|------|---------|----------------|--------------|------------|----------------|-------------------------------|------|------|------|-----------|
|      |         | P.W.BUARD ASSY | APTHM103CA   |            |                |                               |      |      |      |           |
| ITEM | REMARKS | PART CODE      | STOCK NUMBER | PART NAME  | SPECIFICATIONS | SYMBOLIC OR EXPLODED VIEW NO. |      |      |      | Q'TY USED |
| 1    |         | LA1EG0701A     |              | RF COIL    |                | L201                          |      |      |      | 1         |
| 2    |         | LA1EN1131A     |              | RF COIL    |                | L101                          |      |      |      | 1         |
| 3    |         | LA1GE0701A     |              | RF COIL    |                | L107                          |      |      |      | 1         |
| 4    |         | LA1GG0703A     |              | RF COIL    |                | L116                          | L118 | L119 | L120 | 5         |
| 5    |         |                |              |            |                | L205                          |      |      |      |           |
| 6    |         | LCADA3038A     |              | RF COIL    |                | L115                          | L117 |      |      | 2         |
| 7    |         | LDADB3622M     |              | RF COIL    |                | L103                          | L110 |      |      | 2         |
| 8    |         | LDADD3604R     |              | RF COIL    |                | L104                          | L106 |      |      | 2         |
| 9    |         | LF100KEJ2T     |              | CHOKE COIL |                | L102                          | L121 |      |      | 2         |
| 10   |         | LF202KB01S     |              | RF COIL    |                | L206                          |      |      |      | 1         |
| 11   |         | LF562KB01S     |              | RF COIL    |                | L204                          |      |      |      | 1         |
| 12   |         | LF681JC01K     |              | RF COIL    |                | L202                          | L203 |      |      | 2         |
| 13   |         | LJ119H004W     |              | CHOKE COIL |                | CH201                         |      |      |      | 1         |
| 14   |         | LL2CN1001A     |              | RF COIL.   |                | L111                          |      |      |      | 1         |
| 15   |         | LL2GM1001A     |              | RF COIL    |                | L105                          |      |      |      | 1         |
| 16   |         | LL2JR1001A     |              | RF COIL    |                | L114                          |      |      |      | 1         |
| 17   |         | LL2JR1401A     |              | RF COIL    |                | L113                          |      |      |      | 1         |
| 18   |         | LMBDC1502V     |              | RF COIL    |                | L112                          |      |      |      | 1         |
| 19   |         | LNBB01504U     |              | RF COIL    |                | L108                          |      |      |      | 1         |
| 20   |         | LZ5RE1501Z     |              | RF COIL    |                | L108                          | L109 |      |      | 2         |
| 21   |         | MB332SD001     |              | SHIELD     |                |                               |      |      |      | 1         |



|      |         | PART NAME       | PART CODE    |                  |                                   |                               |      |      |      |          |
|------|---------|-----------------|--------------|------------------|-----------------------------------|-------------------------------|------|------|------|----------|
|      |         | P.W. BOARD ASSY | APTBM103CA   |                  |                                   |                               |      |      |      |          |
| ITEM | REMARKS | PART CODE       | STOCK NUMBER | PART NAME        | SPECIFICATIONS                    | SYMBOLIC OR EXPLODED VIEW NO. |      |      |      | QTY USED |
| 1    |         | ML354SD001      |              | SHIELD           |                                   |                               |      |      |      | 1        |
| 2    |         | MS327AD004      |              | HEAT SINK        |                                   |                               |      |      |      | 1        |
| 3    |         | MS625SX001      |              | SHIELD           |                                   |                               |      |      |      | 1        |
| 4    |         | MT260AQ001      |              | HEAT SINK        |                                   |                               |      |      |      | 1        |
| 5    |         | MU543AD001      |              | HEAT SINK        |                                   |                               |      |      |      | 1        |
| 6    |         | MU633SD001      |              | SHIELD           |                                   |                               |      |      |      | 1        |
| 7    |         | MU644AD001      |              | HEAT SINK        |                                   |                               |      |      |      | 1        |
| 8    |         | MW201BS001      |              | TERMINAL         |                                   |                               |      |      |      | 21       |
| 9    |         | MW401CX001      |              | SHORT JUMPER     | JW-10                             |                               |      |      |      | 6        |
| 10   |         | MW401CX003      |              | SHORT JUMPER     |                                   |                               |      |      |      | 2        |
| 11   |         | MW401CX004      |              | SHORT JUMPER     | JW-5                              |                               |      |      |      | 1        |
| 12   |         | MX326CS001      |              | HEAT SINK        |                                   |                               |      |      |      | 1        |
| 13   |         | MX415SS001      |              | CLAMPER          |                                   |                               |      |      |      | 1        |
| 14   |         | PTBM103E0X      |              | PRINTED W. BOARD |                                   |                               |      |      |      | 1        |
| 15   |         | QDG1N60XXT      |              | GERMANIUM DIODE  | 1N60 NO-RANK                      | D205                          |      |      |      | 1        |
| 16   |         | QDG1S34XXT      |              | GERMANIUM DIODE  | 1S34 NO-RANK                      | D202                          | D203 |      |      | 2        |
| 17   |         | QDSM1301XE      |              | SILICON DIODE    | MI301-C1-A VR=80V NO-RANK 26MIN   | D106                          | D107 | D108 | D109 | 4        |
| 18   |         | QDSN4448XZ      |              | SILICON DIODE    | 1N4448 VRM=100V NO-RANK           | D201                          | D211 |      |      | 2        |
| 19   |         | QDSS1555XT      |              | SILICON DIODE    | 1S1555 VR=30 VRM=35 NO-RANK 26MIN | D101                          | D104 | D204 | D207 | 10       |
| 20   |         |                 |              |                  |                                   | D209                          | D210 | D302 | D303 |          |
| 21   |         |                 |              |                  |                                   | D304                          | D305 |      |      |          |



|      |         | PART NAME         | PART CODE    |             |                |                           |                               |      |      |      |          |
|------|---------|-------------------|--------------|-------------|----------------|---------------------------|-------------------------------|------|------|------|----------|
|      |         | P.W.B. BOARD ASSY | APTBM13CA    |             |                |                           |                               |      |      |      |          |
| ITEM | REMARKS | PART CODE         | STOCK NUMBER | PART NAME   | SPECIFICATIONS |                           | SYMBOLIC OR EXPLODED VIEW NO. |      |      |      | QTY USED |
| 1    |         | QDZM7309CE        |              | ZENER DIODE | M7309C         | C-RANK                    | Q301                          |      |      |      | 1        |
| 2    |         | QQM00155BA        |              | I.C.        | UPC555F        |                           | IC202                         |      |      |      | 1        |
| 3    |         | QQM005771A        |              | I.C.        | UPC577F        |                           | IC201                         |      |      |      | 1        |
| 4    |         | QQM07222AT        |              | I.C.        | TA7222AP       | DACKAGE CYB.-MARK         | IC203                         |      |      |      | 1        |
| 5    |         | QTA0496X2T        |              | TRANSISTOR  | 2SA496         | C,Y-RANK                  | Q303                          |      |      |      | 1        |
| 6    |         | QTA0733XAA        |              | TRANSISTOR  | 2SA733         | G-RANK                    | Q104                          | Q115 |      |      | 2        |
| 7    |         | QTB0512XAN        |              | TRANSISTOR  | 2SB512         | P-RANK                    | Q112                          |      |      |      | 1        |
| 8    |         | QTC0456XAT        |              | TRANSISTOR  | 2SC496         | C,Y-RANK                  | Q302                          |      |      |      | 1        |
| 9    |         | QTC0763XAE        |              | TRANSISTOR  | 2SC763         | C,D-RANK                  | Q107                          |      |      |      | 1        |
| 10   |         | QTC0784XAT        |              | TRANSISTOR  | 2SC784         | BN-RANK                   | Q101                          | Q102 | Q203 | Q205 | 4        |
| 11   |         | QTC0900XBA        |              | TRANSISTOR  | 2SC900         | F-RANK                    | Q207                          | Q208 | Q209 |      | 3        |
| 12   |         | QTC0945LAA        |              | TRANSISTOR  | 2SC945L        | P,Q-RANK                  | Q103                          | Q113 | Q114 | Q206 | 5        |
| 13   |         |                   |              |             |                |                           | Q210                          |      |      |      |          |
| 14   |         | QTC0945XBA        |              | TRANSISTOR  | 2SC945         | G-RANK                    | Q304                          | Q305 |      |      | 2        |
| 15   |         | QTC2053XAE        |              | TRANSISTOR  | 2SC2053        | NC-RANK                   | Q108                          |      |      |      | 1        |
| 16   |         | QTD0235XAT        |              | TRANSISTOR  | 2SD235         | G,Y-RANK                  | Q301                          |      |      |      | 1        |
| 17   |         | QTF0237XAM        |              | TRANSISTOR  | MRF237         | NO-RANK (RF.PWR. 8W.MAX)  | Q110                          |      |      |      | 1        |
| 18   |         | QTF0238XAM        |              | TRANSISTOR  | MRF238         | NO-RANK (RF.PWR. 30W.MAX) | Q111                          |      |      |      | 1        |
| 19   |         | QTK0023AAS        |              | TRANSISTOR  | 2SK23A         | 540                       | Q202                          | Q204 |      |      | 2        |
| 20   |         | QTK0120XAS        |              | TRANSISTOR  | 2SK120         | Z-RANK                    | Q106                          |      |      |      | 1        |
| 21   |         | QTK0125XAS        |              | TRANSISTOR  | 2SK125         | S-RANK                    | Q105                          |      |      |      | 1        |



|      |         | PART NAME      | PART CODE    |                 |                              |                               |      |      |      |           |
|------|---------|----------------|--------------|-----------------|------------------------------|-------------------------------|------|------|------|-----------|
|      |         | P.W.BCAPD ASSY | APTBM103CA   |                 |                              |                               |      |      |      |           |
| ITEM | REMARKS | PART CODE      | STOCK NUMBER | PART NAME       | SPECIFICATIONS               | SYMBOLIC OR EXPLODED VIEW NO. |      |      |      | Q'TY USED |
| 1    |         | QTL3N201BM     |              | TRANSISTOR      | 3N201B                       | Q201                          |      |      |      | 1         |
| 2    |         | QTN4427XAM     |              | TRANSISTOR      | 2N4427 NO-RANK               | Q109                          |      |      |      | 1         |
| 3    |         | QVCSV02XXD     |              | VARIATOR        | SV02 NO-RANK                 | D102                          |      |      |      | 1         |
| 4    |         | QVFSV04XXD     |              | VARIATOR        | SV04 NO-RANK (VF:2.10-2.60V) | D103                          |      |      |      | 1         |
| 5    |         | RC13GK104X     |              | FIXED CARBON R. | 1/8W 100K OHM 10%            | R134                          | R135 |      |      | 2         |
| 6    |         | RD25PJ100X     |              | CARBON FILM R.  | 0.25W 10 OHM 5%              | R209                          | R218 | R224 | R226 | 4         |
| 7    |         | RD25PJ101X     |              | CARBON FILM R.  | 0.25W 100 OHM 5%             | R103                          | R107 | R206 | R211 | 7         |
| 8    |         |                |              |                 |                              | R217                          | R236 | R251 |      |           |
| 9    |         | RD25PJ102X     |              | CARBON FILM R.  | 0.25W 1K OHM 5%              | R108                          | R114 | R130 | R212 | 6         |
| 10   |         |                |              |                 |                              | R250                          | R309 |      |      |           |
| 11   |         | RD25PJ103X     |              | CARBON FILM R.  | 0.25W 10K OHM 5%             | R201                          | R248 |      |      | 2         |
| 12   |         | RD25PJ151X     |              | CARBON FILM R.  | 0.25W 150 OHM 5%             | R117                          |      |      |      | 1         |
| 13   |         | RD25PJ152X     |              | CARBON FILM R.  | 0.25W 1.5K OHM 5%            | R137                          | R302 |      |      | 2         |
| 14   |         | RD25PJ153X     |              | CARBON FILM R.  | 0.25W 15K OHM 5%             | R128                          | R213 | R221 |      | 3         |
| 15   |         | RD25PJ2R2X     |              | CARBON FILM R.  | 0.25W 2.2 OHM 5%             | R124                          |      |      |      | 1         |
| 16   |         | RD25PJ220X     |              | CARBON FILM R.  | 0.25W 22 OHM 5%              | R113                          |      |      |      | 1         |
| 17   |         | RD25PJ221X     |              | CARBON FILM R.  | 0.25W 220 OHM 5%             | R123                          |      |      |      | 1         |
| 18   |         | RD25PJ222X     |              | CARBON FILM R.  | 0.25W 2.2K OHM 5%            | R110                          | R112 | R127 | R208 | 8         |
| 19   |         |                |              |                 |                              | R223                          | R304 | R305 | R306 |           |
| 20   |         | RD25PJ223X     |              | CARBON FILM R.  | 0.25W 22K OHM 5%             | R129                          | R232 | R246 |      | 3         |
| 21   |         | RD25PJ224X     |              | CARBON FILM R.  | 0.25W 220K OHM 5%            | R235                          |      |      |      | 1         |



|      |         | PART NAME       | PART CODE    |                |                   |                               |      |      |      |          |
|------|---------|-----------------|--------------|----------------|-------------------|-------------------------------|------|------|------|----------|
|      |         | P.W. BOARD ASSY | APTBM1C3CA   |                |                   |                               |      |      |      |          |
| ITEM | REMARKS | PART CODE       | STOCK NUMBER | PART NAME      | SPECIFICATIONS    | SYMBOLIC OR EXPLODED VIEW NO. |      |      |      | QTY USED |
| 1    |         | RD25PJ272X      |              | CARBON FILM R. | 0.25W 2.7K OHM 5% | R122                          |      |      |      | 1        |
| 2    |         | RD25PJ331X      |              | CARBON FILM R. | 0.25W 330 OHM 5%  | R119                          | R203 | R215 | R220 | 4        |
| 3    |         | RD25PJ332X      |              | CARBON FILM R. | 0.25W 3.3K OHM 5% | R219                          | R303 |      |      | 2        |
| 4    |         | RD25PJ391X      |              | CARBON FILM R. | 0.25W 390 OHM 5%  | R116                          | R125 |      |      | 2        |
| 5    |         | RD25PJ4F7X      |              | CARBON FILM R. | 0.25W 4.7 OHM 5%  | R121                          | R247 |      |      | 2        |
| 6    |         | RD25PJ470X      |              | CARBON FILM R. | 0.25W 47 OHM 5%   | R115                          |      |      |      | 1        |
| 7    |         | RD25PJ472X      |              | CARBON FILM R. | 0.25W 4.7K OHM 5% | R102                          | R105 | R109 | R120 | 7        |
| 8    |         |                 |              |                |                   | R214                          | R216 | R222 |      |          |
| 9    |         | RD25PJ473X      |              | CARBON FILM R. | 0.25W 47K OHM 5%  | R111                          | R136 | R205 |      | 3        |
| 10   |         | RD25PJ474X      |              | CARBON FILM R. | 0.25W 470K OHM 5% | R244                          |      |      |      | 1        |
| 11   |         | RD25PJ560X      |              | CARBON FILM R. | 0.25W 56 OHM 5%   | R131                          |      |      |      | 1        |
| 12   |         | RD25PJ562X      |              | CARBON FILM R. | 0.25W 5.6K OHM 5% | R229                          | R230 |      |      | 2        |
| 13   |         | RD25PJ680X      |              | CARBON FILM R. | 0.25W 68 OHM 5%   | R118                          |      |      |      | 1        |
| 14   |         | RD25PJ681X      |              | CARBON FILM R. | 0.25W 680 OHM 5%  | R106                          |      |      |      | 1        |
| 15   |         | RD25PJ682X      |              | CARBON FILM R. | 0.25W 6.8K OHM 5% | R101                          | R104 |      |      | 2        |
| 16   |         | RD25PJ823X      |              | CARBON FILM R. | 0.25W 82K OHM 5%  | R126                          |      |      |      | 1        |
| 17   |         | RD25TJ472X      |              | CARBON FILM R. | 0.25W 4.7K OHM 5% | R313                          |      |      |      | 1        |
| 18   |         | RD25VJ100X      |              | CARBON FILM R. | 0.25W 10 OHM 5%   | R204                          | R228 |      |      | 2        |
| 19   |         | RD25VJ102X      |              | CARBON FILM R. | 0.25W 1K OHM 5%   | R240                          |      |      |      | 1        |
| 20   |         | RD25VJ103X      |              | CARBON FILM R. | 0.25W 10K OHM 5%  | R227                          | R255 |      |      | 2        |
| 21   |         | RD25VJ152X      |              | CARBON FILM R. | 0.25W 1.5K OHM 5% | R225                          | R238 | R243 | R245 | 5        |



|      |         | PART NAME        | PART CODE    |                 |                   |                               |      |      |      |          |
|------|---------|------------------|--------------|-----------------|-------------------|-------------------------------|------|------|------|----------|
|      |         | P.W.B. JARD ASSY | APTBM103CA   |                 |                   |                               |      |      |      |          |
| ITEM | REMARKS | PART CODE        | STOCK NUMBER | PART NAME       | SPECIFICATIONS    | SYMBOLIC OR EXPLODED VIEW NO. |      |      |      | QTY USED |
| 1    |         |                  |              |                 |                   | R254                          |      |      |      |          |
| 2    |         | RD25VJ153X       |              | CARBON FILM R.  | 0.25W 15K OHM 5%  | R253                          |      |      |      | 1        |
| 3    |         | RD25VJ222X       |              | CARBON FILM R.  | 0.25W 2.2K OHM 5% | R241                          | R242 |      |      | 2        |
| 4    |         | RD25VJ473X       |              | CARBON FILM R.  | 0.25W 47K OHM 5%  | R202                          |      |      |      | 1        |
| 5    |         | RD25VJ563X       |              | CARBON FILM R.  | 0.25W 56K OHM 5%  | R237                          |      |      |      | 1        |
| 6    |         | RD25VJ682X       |              | CARBON FILM R.  | 0.25W 6.8K OHM 5% | R239                          |      |      |      | 1        |
| 7    |         | RGHAPJ102B       |              | M-OXIDE FILM R. | 1/2W 1K OHM 5%    | R132                          |      |      |      | 1        |
| 8    |         | RGHAPJ221B       |              | M-OXIDE FILM R. | 1/2W 220 OHM 5%   | R301                          |      |      |      | 1        |
| 9    |         | RG24NJ820R       |              | M-OXIDE FILM R. | 2W 82 OHM 5%      | R133                          |      |      |      | 1        |
| 10   |         | RPGNB30301       |              | SEMI-FIXED VR.  |                   | RV101                         |      |      |      | 1        |
| 11   |         | RPGNB50303       |              | SEMI-FIXED VR.  | 50K OHM 8-CURVE   | RV102                         |      |      |      | 1        |
| 12   |         | TR07LAC04N       |              | I.F.T.          |                   | T210                          |      |      |      | 1        |
| 13   |         | TR07LAC14S       |              | RF COIL         |                   | T212                          | T213 |      |      | 2        |
| 14   |         | TR10GP004S       |              | RF COIL         |                   | T101                          | T102 | T103 | T104 | 5        |
| 15   |         |                  |              |                 |                   | T105                          |      |      |      |          |
| 16   |         | TR10GZC09M       |              | RF COIL         |                   | T107                          |      |      |      | 1        |
| 17   |         | TR10GZ010M       |              | RF COIL         |                   | T106                          |      |      |      | 1        |
| 18   |         | TR10MD005S       |              | RF TRANS        |                   | T209                          |      |      |      | 1        |
| 19   |         | TR10MR007S       |              | I.F.T.          |                   | T208                          |      |      |      | 1        |
| 20   |         | TP13GJ001S       |              | RF COIL         |                   | T201                          |      |      |      | 1        |
| 21   |         | TR13GM003S       |              | RF COIL         |                   | T202                          |      |      |      | 1        |



|      |         | PART NAME      | PART CODE    |                 |                   |                               |  |  |  |           |
|------|---------|----------------|--------------|-----------------|-------------------|-------------------------------|--|--|--|-----------|
|      |         | P.W.BOARD ASSY | AP1BM103CA   |                 |                   |                               |  |  |  |           |
| ITEM | REMARKS | PART CODE      | STOCK NUMBER | PART NAME       | SPECIFICATIONS    | SYMBOLIC OR EXPLODED VIEW NO. |  |  |  | Q'TY USED |
| 1    |         | TR13GM005S     |              | RF COIL         |                   | I203                          |  |  |  | 1         |
| 2    |         | TR13GM007S     |              | RF COIL         |                   | I204                          |  |  |  | 1         |
| 3    |         | TR13GM009S     |              | RF COIL         |                   | I205                          |  |  |  | 1         |
| 4    |         | TR13GM011S     |              | RF COIL         |                   | I206                          |  |  |  | 1         |
| 5    |         | TR13GM013S     |              | RF COIL         |                   | I207                          |  |  |  | 1         |
| 16   |         | XAZ1A6C01X     |              | XTAL OSCILLATOR | HC-18/L 16.800MHZ | X102                          |  |  |  | 1         |
| 17   |         | XAZ1A6072X     |              | XTAL OSCILLATOR | HC-18/L 20.945MHZ | X201                          |  |  |  | 1         |
| 18   |         | XAZ1A6C03X     |              | XTAL OSCILLATOR | HC-18/L 21.400MHZ | X101                          |  |  |  | 1         |
| 19   |         | YFLC00C004     |              | FERRITE BEAD    |                   |                               |  |  |  | 3         |
| 20   |         |                |              |                 |                   |                               |  |  |  |           |

|      |         | PART NAME      | PART CODE    |                 |                       |                               |  |  |  |           |
|------|---------|----------------|--------------|-----------------|-----------------------|-------------------------------|--|--|--|-----------|
|      |         | P.W.BOARD ASSY | APTLC075AA   |                 |                       |                               |  |  |  |           |
| ITEM | REMARKS | PART CODE      | STOCK NUMBER | PART NAME       | SPECIFICATIONS        | SYMBOLIC OR EXPLODED VIEW NO. |  |  |  | Q'TY USED |
| 1    |         | ACCN436GEA     |              | CONN. CORD ASSY |                       |                               |  |  |  | 1         |
| 2    |         | BTTP26C6AN     |              | PAN TAP SCREW   | (+)BIT, M2.6 X 6 S-NI |                               |  |  |  | 2         |
| 3    |         | PTLD075C0X     |              | PRINTED W.BDARD |                       |                               |  |  |  | 1         |
| 4    |         | QL+L22715C     |              | LED             | CTX-5500              | LED1                          |  |  |  | 1         |
| 5    |         |                |              |                 |                       |                               |  |  |  |           |
| 6    |         |                |              |                 |                       |                               |  |  |  |           |
| 7    |         |                |              |                 |                       |                               |  |  |  |           |
| 8    |         |                |              |                 |                       |                               |  |  |  |           |
| 9    |         |                |              |                 |                       |                               |  |  |  |           |



|      |         | PART NAME        | PART CODE    |                 |                |       |                    |                               |     |     |     |           |
|------|---------|------------------|--------------|-----------------|----------------|-------|--------------------|-------------------------------|-----|-----|-----|-----------|
|      |         | P.W. BOARD ASSY. | APTDL03BA    |                 |                |       |                    |                               |     |     |     |           |
| ITEM | REMARKS | PART CODE        | STOCK NUMBER | PART NAME       | SPECIFICATIONS |       |                    | SYMBOLIC OR EXPLODED VIEW NO. |     |     |     | Q'TY USED |
| 1    |         | CB01B104FM       |              | CERAMIC CAP.    | 0.1MFD         | 12.5V | -20, +20%          | C2                            | C3  | C4  |     | 3         |
| 2    |         | CCCB020CPM       |              | CERAMIC CAP.    | PK             | 2PF   | 50V -0.25, +0.25PF | C16                           |     |     |     | 1         |
| 3    |         | CCCB060DPM       |              | CERAMIC CAP.    | PH             | 6PF   | 50V -0.5, +0.5PF   | C9                            |     |     |     | 1         |
| 4    |         | CCCB080DFM       |              | CERAMIC CAP.    | PH             | 8PF   | 50V -0.5, +0.5PF   | C12                           |     |     |     | 1         |
| 5    |         | CCCB100DCM       |              | CERAMIC CAP.    | CH             | 10PF  | 50V -0.5, +0.5PF   | C25                           |     |     |     | 1         |
| 6    |         | CCCB100DFM       |              | CERAMIC CAP.    | PH             | 10PF  | 50V -0.5, +0.5PF   | C29                           |     |     |     | 1         |
| 7    |         | CCCB150KOM       |              | CERAMIC CAP.    |                | 15PF  | 50V -10, +10% SL   | C34                           | C35 |     |     | 2         |
| 8    |         | CCDB150KCM       |              | CERAMIC CAP.    |                | 15PF  | 50V -10, +10% CH   | C23                           |     |     |     | 1         |
| 9    |         | CCDB220KPM       |              | CERAMIC CAP.    |                | 22PF  | 50V -10, +10% PH   | C22                           |     |     |     | 1         |
| 10   |         | CCDB221KPM       |              | CERAMIC CAP.    |                | 220PF | 50V -10, +10% PH   | C18                           |     |     |     | 1         |
| 11   |         | CCDB390KCM       |              | CERAMIC CAP.    |                | 39PF  | 50V -10, +10% SL   | C5                            |     |     |     | 1         |
| 12   |         | CCDB470KPM       |              | CERAMIC CAP.    |                | 47PF  | 50V -10, +10% PH   | C24                           | C67 |     |     | 2         |
| 13   |         | CCDB680KPM       |              | CERAMIC CAP.    |                | 68PF  | 50V -10, +10% PH   | C19                           |     |     |     | 1         |
| 14   |         | CEAC101ALX       |              | ELYT. CAPACITOR | 100MFD         | 10V   |                    | C32                           |     |     |     | 1         |
| 15   |         | CEAC330ALX       |              | ELYT. CAPACITOR | 33MFD          | 10V   |                    | C56                           | C57 |     |     | 2         |
| 16   |         | CEAD100ALX       |              | ELYT. CAPACITOR | 10MFD          | 16V   |                    | C41                           |     |     |     | 1         |
| 17   |         | CEAD330ALX       |              | ELYT. CAPACITOR | 33MFD          | 16V   |                    | C36                           |     |     |     | 1         |
| 18   |         | CEAE4R7ALX       |              | ELYT. CAPACITOR | 4.7MFD         | 25V   |                    | C52                           | C59 | C62 |     | 3         |
| 19   |         | CKCB222KBM       |              | CERAMIC CAP.    | 2200PF         | 50V   | -10, +10% B        | C21                           | C53 | C55 | C58 | 4         |
| 20   |         | CKDB1J3KBU       |              | CERAMIC CAP.    | 0.01MFD        | 50V   | -10, +10% B        | C1                            | C10 | C11 | C13 | 29        |
| 21   |         |                  |              |                 |                |       |                    | C14                           | C15 | C17 | C20 |           |



|      |         | PART NAME        |              | PART CODE        |                            |                               |     |     |     |           |
|------|---------|------------------|--------------|------------------|----------------------------|-------------------------------|-----|-----|-----|-----------|
|      |         | P.W. BOARD ASSY. |              | APTPL003RA       |                            |                               |     |     |     |           |
| ITEM | REMARKS | PART CODE        | STOCK NUMBER | PART NAME        | SPECIFICATIONS             | SYMBOLIC OR EXPLODED VIEW NO. |     |     |     | Q'TY USED |
| 1    |         |                  |              |                  |                            | C26                           | C28 | C30 | C31 |           |
| 2    |         |                  |              |                  |                            | C33                           | C42 | C43 | C44 |           |
| 3    |         |                  |              |                  |                            | C45                           | C46 | C47 | C48 |           |
| 4    |         |                  |              |                  |                            | C49                           | C50 | C51 | C6  |           |
| 5    |         |                  |              |                  |                            | C65                           | C66 | C68 | C7  |           |
| 6    |         |                  |              |                  |                            | C8                            |     |     |     |           |
| 7    |         | CQMB103KEH       |              | MYLAR CAPACITOR  | 0.01MFD 50V -10, +10%      | C39                           | C40 | C54 |     | 3         |
| 8    |         | CQMB104KEH       |              | MYLAR CAPACITOR  | 0.1MFD 50V -10, +10%       | C63                           | C64 |     |     | 2         |
| 9    |         | CQMB122KEH       |              | MYLAR CAPACITOR  | 120CPF 50V -10, +10%       | C61                           |     |     |     | 1         |
| 10   |         | CQMB153KEH       |              | MYLAR CAPACITOR  | 0.015MFD 50V -10, +10%     | C60                           |     |     |     | 1         |
| 11   |         | CSSF100MFC       |              | TANTALUM CAP.    | 1CMFD 35V -20, +20%        | C27                           |     |     |     | 1         |
| 12   |         | CSSF100MDN       |              | TANTALUM CAP.    | 10MFD 35V -20, +20%        | C38                           |     |     |     | 1         |
| 13   |         | CSSF2R2MDN       |              | TANTALUM CAP.    | 2.2MFD 35V -20, +20%       | C37                           |     |     |     | 1         |
| 14   |         | CTZ7200K01       |              | TRIMMER CAP.     |                            | CT1                           | CT2 |     |     | 2         |
| 15   |         | LF100KE02T       |              | CHOKE COIL       |                            | L1                            | L5  |     |     | 2         |
| 16   |         | LF563JC02S       |              | RF COIL          |                            | L6                            |     |     |     | 1         |
| 17   |         | LF680KD01N       |              | RF COIL          |                            | L2                            | L4  | L7  |     | 3         |
| 18   |         | MW401CX001       |              | SHORT JUMPER     | Jw-10                      |                               |     |     |     | 1         |
| 19   |         | PTPL003FOX       |              | PRINTED W. BOARD |                            |                               |     |     |     | 1         |
| 20   |         | QDSMC301XE       |              | SILICON DIODE    | MC301 VR-30V NO-RANK 26MIN | D1                            | D2  |     |     | 2         |
| 21   |         | QDSV06CXXB       |              | SILICON DIODE    | V06C VRM=200 29MIN         | D3                            | D4  |     |     | 2         |



|      |         | PART NAME        | PART CODE    |                 |                                 |                               |     |     |     |          |
|------|---------|------------------|--------------|-----------------|---------------------------------|-------------------------------|-----|-----|-----|----------|
|      |         | P.W. BDAFC ASSY. | APTPL003BA   |                 |                                 |                               |     |     |     |          |
| ITEM | REMARKS | PART CODE        | STOCK NUMBER | PART NAME       | SPECIFICATIONS                  | SYMBOLIC OR EXPLODED VIEW NO. |     |     |     | QTY USED |
| 1    |         | QDZM7307CE       |              | ZENER DIODE     | MZ307-C VZ=7.0-7.6V C-RANK26MIN | D5                            |     |     |     | 1        |
| 2    |         | QQM00555EA       |              | I.C.            | UPC555E                         | IC1                           |     |     |     | 1        |
| 3    |         | QQM74553AJ       |              | I.C.            | NJM455ED OPERATIONAL AMP.       | IC3                           |     |     |     | 1        |
| 4    |         | QQM78L09AT       |              | I.C.            | TA78L009AP                      | IC4                           |     |     |     | 1        |
| 5    |         | QQ3PLLC7AN       |              | I.C.            | PLL07A(MN6143) MARINE PLL       | IC2                           |     |     |     | 1        |
| 6    |         | QTC0710XBE       |              | TRANSISTOR      | 2SC710 D-RANK                   | Q4                            | Q7  |     |     | 2        |
| 7    |         | QTC0763XBE       |              | TRANSISTOR      | 2SC763 C-RANK                   | Q1                            | Q5  |     |     | 2        |
| 8    |         | QTL3N201BM       |              | TRANSISTOR      | 3N201B                          | Q2                            | Q3  | Q6  |     | 3        |
| 9    |         | RAB472K07N       |              | R ARRAY         |                                 | RA1                           |     |     |     | 1        |
| 10   |         | RC14GK153X       |              | FIXED CARBON R. | 1/4W 15K OHM 10%                | R21                           |     |     |     | 1        |
| 11   |         | RC14GK220X       |              | FIXED CARBON R. | 1/4W 22 OHM 10%                 | R56                           |     |     |     | 1        |
| 12   |         | RC14GK331X       |              | FIXED CARBON R. | 1/4W 330 OHM 10%                | R28                           |     |     |     | 1        |
| 13   |         | RD25PJ101X       |              | CARBON FILM R.  | 0.25W 100 OHM 5%                | R35                           | R36 | R37 | R38 | 7        |
| 14   |         |                  |              |                 |                                 | R39                           | R40 | R41 |     |          |
| 15   |         | RD25PJ152X       |              | CARBON FILM R.  | 0.25W 1.5K OHM 5%               | R4                            |     |     |     | 1        |
| 16   |         | RD25PJ331X       |              | CARBON FILM R.  | 0.25W 330 OHM 5%                | R23                           |     |     |     | 1        |
| 17   |         | RD25PJ562X       |              | CARBON FILM R.  | 0.25W 5.6K OHM 5%               | R20                           |     |     |     | 1        |
| 18   |         | RD25PJ680X       |              | CARBON FILM R.  | 0.25W 68 OHM 5%                 | R5                            |     |     |     | 1        |
| 19   |         | RD25PJ682X       |              | CARBON FILM R.  | 0.25W 6.8K OHM 5%               | R32                           |     |     |     | 1        |
| 20   |         | RD25RJ102X       |              | CARBON FILM R.  | 0.25W 1K OHM 5%                 | R19                           |     |     |     | 1        |
| 21   |         | RD25TJ102X       |              | CARBON FILM R.  | 0.25W 1K OHM 5%                 | R60                           |     |     |     | 1        |



|      |         | PART NAME       | PART CODE    |                |                   |                               |     |     |     |           |
|------|---------|-----------------|--------------|----------------|-------------------|-------------------------------|-----|-----|-----|-----------|
|      |         | P.W. BEAK ASSY. | APTPL003BA   |                |                   |                               |     |     |     |           |
| ITEM | REMARKS | PART CODE       | STOCK NUMBER | PART NAME      | SPECIFICATIONS    | SYMBOLIC OR EXPLODED VIEW NO. |     |     |     | Q'TY USED |
| 1    |         | RD25VJ101X      |              | CARBON FILM R. | 0.25W 100 OHM 5%  | R10                           | R14 | R27 | R29 | 7         |
| 2    |         |                 |              |                |                   | R57                           | R6  | P8  |     |           |
| 3    |         | RD25VJ102X      |              | CARBON FILM R. | 0.25W 1K OHM 5%   | R2                            | R58 |     |     | 2         |
| 4    |         | RD25VJ103X      |              | CARBON FILM R. | 0.25W 10K OHM 5%  | R48                           | R50 |     |     | 2         |
| 5    |         | RD25VJ104X      |              | CARBON FILM R. | 0.25W 100K OHM 5% | R13                           | R54 |     |     | 2         |
| 6    |         | PD25VJ125X      |              | CARBON FILM P. | 0.25W 1.2M OHM 5% | R47                           |     |     |     | 1         |
| 7    |         | RD25VJ150X      |              | CARBON FILM R. | 0.25W 15 OHM 5%   | R17                           |     |     |     | 1         |
| 8    |         | RD25VJ152X      |              | CARBON FILM R. | 0.25W 1.5K OHM 5% | R18                           | R22 |     |     | 2         |
| 9    |         | RD25VJ154X      |              | CARBON FILM R. | 0.25W 150K OHM 5% | R3                            |     |     |     | 1         |
| 10   |         | PD25VJ181X      |              | CARBON FILM P. | 0.25W 180 OHM 5%  | R31                           |     |     |     | 1         |
| 11   |         | RD25VJ220X      |              | CARBON FILM R. | 0.25W 22 OHM 5%   | R26                           | R7  | R9  |     | 3         |
| 12   |         | RD25VJ221X      |              | CARBON FILM R. | 0.25W 220 OHM 5%  | R53                           |     |     |     | 1         |
| 13   |         | RD25VJ222X      |              | CARBON FILM R. | 0.25W 2.2K OHM 5% | R43                           | R59 |     |     | 2         |
| 14   |         | RD25VJ223X      |              | CARBON FILM R. | 0.25W 22K OHM 5%  | R34                           | R52 |     |     | 2         |
| 15   |         | RD25VJ272X      |              | CARBON FILM R. | 0.25W 2.7K OHM 5% | R46                           |     |     |     | 1         |
| 16   |         | RD25VJ273X      |              | CARBON FILM R. | 0.25W 27K OHM 5%  | R11                           | R16 | R24 |     | 3         |
| 17   |         | RD25VJ331X      |              | CARBON FILM R. | 0.25W 330 OHM 5%  | R30                           |     |     |     | 1         |
| 18   |         | RD25VJ332X      |              | CARBON FILM R. | 0.25W 3.3K OHM 5% | R51                           |     |     |     | 1         |
| 19   |         | RD25VJ393X      |              | CARBON FILM R. | 0.25W 39K OHM 5%  | R45                           |     |     |     | 1         |
| 20   |         | RD25VJ471X      |              | CARBON FILM R. | 0.25W 470 OHM 5%  | R55                           |     |     |     | 1         |
| 21   |         | RD25VJ472X      |              | CARBON FILM R. | 0.25W 4.7K OHM 5% | R42                           | R49 |     |     | 2         |







|      |         | PART NAME          | PART CODE    |                  |                |          |         |                               |     |     |    |          |   |
|------|---------|--------------------|--------------|------------------|----------------|----------|---------|-------------------------------|-----|-----|----|----------|---|
|      |         | P.W.B. BOARD ASSY. | APTVC002A1   |                  |                |          |         |                               |     |     |    |          |   |
| ITEM | REMARKS | PART CODE          | STOCK NUMBER | PART NAME        | SPECIFICATIONS |          |         | SYMBOLIC OR EXPLODED VIEW NO. |     |     |    | QTY USED |   |
| 1    |         | CCCB0300CM         |              | CERAMIC CAP.     | CJ             | 3PF      | 50V     | -0.25, +0.25PF                | C2  |     |    |          | 1 |
| 2    |         | CCCB0400CPM        |              | CERAMIC CAP.     | PH             | 4PF      | 50V     | -0.25, +0.25PF                | C3  |     |    |          | 1 |
| 3    |         | CCCB0500CM         |              | CERAMIC CAP.     | CH             | 5PF      | 50V     | -0.5, +0.5PF                  | C4  |     |    |          | 1 |
| 4    |         | CCCB1000CM         |              | CERAMIC CAP.     | CH             | 10PF     | 50V     | -0.5, +0.5PF                  | C1  |     |    |          | 1 |
| 5    |         | CKDR103PFM         |              | CERAMIC CAP.     |                | 0.01MFD  | 50V     | -0, +100% E                   | C5  | C7  |    |          | 2 |
| 6    |         | CSSF010MDN         |              | TANTALUM CAP.    |                | 1MFD     | 35V     | -20, +20%                     | C6  |     |    |          | 1 |
| 7    |         | MW401CX001         |              | SHORT JUMPER     | JW-10          |          |         |                               |     |     |    |          | 1 |
| 8    |         | PTVCC02FOX         |              | PRINTED W. BOARD |                |          |         |                               |     |     |    |          | 1 |
| 9    |         | QDCB122YU          |              | VARI-CAP. DIODE  | BB-122         | 28V      | NO-RANK | 26MIN                         | D1  |     |    |          | 1 |
| 10   |         | QTK0023AAS         |              | TRANSISTOR       | 2SK23A         | 540      |         |                               |     | Q1  |    |          | 1 |
| 11   |         | RD25RJ273X         |              | CARBON FILM R.   | 0.25W          | 27K OHM  | 5%      |                               |     |     | R2 |          | 1 |
| 12   |         | RD25RJ334X         |              | CARBON FILM R.   | 0.25W          | 230K OHM | 5%      |                               |     |     | R3 |          | 1 |
| 13   |         | RD25RJ392X         |              | CARBON FILM R.   | 0.25W          | 3.9K OHM | 5%      |                               |     |     | R1 |          | 1 |
| 14   |         | TR10GPC01S         |              | RF COIL          |                |          |         |                               | T1  |     |    |          | 1 |
| 15   |         | WYR004CCAA         |              | STRANDED WIRE    |                |          |         |                               | NO4 | NO5 |    |          | 2 |
| 16   |         | WYR104CCAA         |              | STRANDED WIRE    |                |          |         |                               | NO1 |     |    |          | 1 |
| 17   |         | WYP204CCAA         |              | STRANDED WIRE    |                |          |         |                               | NO2 |     |    |          | 1 |
| 18   |         | WYR304CCAA         |              | STRANDED WIRE    |                |          |         |                               | NO3 |     |    |          | 1 |
| 19   |         |                    |              |                  |                |          |         |                               |     |     |    |          |   |
| 20   |         |                    |              |                  |                |          |         |                               |     |     |    |          |   |
| 21   |         |                    |              |                  |                |          |         |                               |     |     |    |          |   |



|      |         | PART NAME       | PART CODE    |                 |                |     |              |                               |     |     |    |          |
|------|---------|-----------------|--------------|-----------------|----------------|-----|--------------|-------------------------------|-----|-----|----|----------|
|      |         | P.W. BOARD ASSY | APTZZ076AA   |                 |                |     |              |                               |     |     |    |          |
| ITEM | REMARKS | PART CODE       | STOCK NUMBER | PART NAME       | SPECIFICATIONS |     |              | SYMBOLIC OR EXPLODED VIEW NO. |     |     |    | QTY USED |
| 1    |         | BSPB3005VN      |              | BIND HEAD SCREW | (+)BIT, M3     | X 5 | S-NI         |                               |     |     |    | 1        |
| 2    |         | CB01E473FM      |              | CERAMIC CAP.    | 0.047MFD       | 25V | -20, +20%    | C2                            | C23 | C26 | C3 | 5        |
| 3    |         |                 |              |                 |                |     |              | C9                            |     |     |    |          |
| 4    |         | CCDB470KPM      |              | CERAMIC CAP.    | 47PF           | 50V | -10, +10% PH | C5                            |     |     |    | 1        |
| 5    |         | CEAC220ALX      |              | ELYT. CAPACITOR | 22MFD          | 10V |              | C8                            |     |     |    | 1        |
| 6    |         | CEAD100ALX      |              | ELYT. CAPACITOR | 10MFD          | 16V |              | C18                           |     |     |    | 1        |
| 7    |         | CEAD101ALX      |              | ELYT. CAPACITOR | 10CMFD         | 16V |              | C12                           | C17 | C27 |    | 3        |
| 8    |         | CEAD102ALX      |              | ELYT. CAPACITOR | 100CMFD        | 16V |              | C10                           |     |     |    | 1        |
| 9    |         | CEAD470ALX      |              | ELYT. CAPACITOR | 47MFD          | 16V |              | C1                            | C15 |     |    | 2        |
| 10   |         | CEAD471ACX      |              | ELYT. CAPACITOR | 47CMFD         | 16V | S-SERIES     |                               |     |     |    | 2        |
| 11   |         | CEAE4R7ALX      |              | ELYT. CAPACITOR | 4.7MFD         | 25V |              | C19                           |     |     |    | 1        |
| 12   |         | CEAE470ALX      |              | ELYT. CAPACITOR | 47MFD          | 25V |              | C28                           |     |     |    | 1        |
| 13   |         | CEAG0R1ZMN      |              | ELYT. CAPACITOR | 0.1MFD         | 50V | MS           | C24                           |     |     |    | 1        |
| 14   |         | CEAG010ALX      |              | ELYT. CAPACITOR | 1MFD           | 50V |              | C22                           |     |     |    | 1        |
| 15   |         | CEAG010NLX      |              | ELYT. CAPACITOR |                |     |              | C20                           |     |     |    | 1        |
| 16   |         | CEAG2R2ALX      |              | ELYT. CAPACITOR | 2.2MFD         | 50V |              | C6                            |     |     |    | 1        |
| 17   |         | CKDB103PFM      |              | CERAMIC CAP.    | 0.01MFD        | 50V | -0, +100% E  | C16                           |     |     |    | 1        |
| 18   |         | CKDB222KBM      |              | CERAMIC CAP.    | 2200PF         | 50V | -10, +10% B  | C13                           |     |     |    | 1        |
| 19   |         | CKDB472KBM      |              | CERAMIC CAP.    | 4700PF         | 50V | -10, +10% B  | C14                           |     |     |    | 1        |
| 20   |         | ML321AD001      |              | HEAT SINK       |                |     |              |                               |     |     |    | 1        |
| 21   |         | MW27135012      |              | TERMINAL        |                |     |              |                               |     |     |    | 24       |



|      |         | PART NAME       | PART CODE    |                 |                                     |                               |     |     |     |           |
|------|---------|-----------------|--------------|-----------------|-------------------------------------|-------------------------------|-----|-----|-----|-----------|
|      |         | P.W. BOARD ASSY | APTZZ076AA   |                 |                                     |                               |     |     |     |           |
| ITEM | REMARKS | PART CODE       | STOCK NUMBER | PART NAME       | SPECIFICATIONS                      | SYMBOLIC OR EXPLODED VIEW NO. |     |     |     | Q'TY USED |
| 1    |         | PTZZ076H1X      |              | P.W. BOARD      |                                     |                               |     |     |     | 1         |
| 2    |         | QDGLS34AXT      |              | GERMANIUM DIODE | 1S34 NO-RANK                        | D10                           | D11 | D12 | D13 | 10        |
| 3    |         |                 |              |                 |                                     | D14                           | D15 | D21 | D7  |           |
| 4    |         |                 |              |                 |                                     | D8                            | D9  |     |     |           |
| 5    |         | QDSMA150XN      |              | SILICON DIODE   | MA150 VF=1.2V,VR=35V NO-RANK 24MIN  | D1                            | D16 | D17 | D18 | 12        |
| 6    |         |                 |              |                 |                                     | D19                           | D2  | D20 | D22 |           |
| 7    |         |                 |              |                 |                                     | D25                           | D26 | D3  | D4  |           |
| 8    |         | QDZMZ304AE      |              | ZENER DIODE     | MZ304A                              | D6                            |     |     |     | 1         |
| 9    |         | QDZMZ305BE      |              | ZENER DIODE     | MZ305B VZ=4.8-5.4V 26MIN            | D23                           |     |     |     | 1         |
| 10   |         | QDZMZ309CE      |              | ZENER DIODE     | MZ309C C-RANK                       | D5                            |     |     |     | 1         |
| 11   |         | QQM012F8AC      |              | I.C.            | LB1288 DECOD-DRIVER                 | U8                            | U9  |     |     | 2         |
| 12   |         | QQM07140AT      |              | I.C.            | TA7140P                             | U7                            |     |     |     | 1         |
| 13   |         | QQM51204AE      |              | I.C.            | M51204L                             | U2                            |     |     |     | 1         |
| 14   |         | QWP73ASLAU      |              | I.C.            | MP0073ASL                           | U1                            |     |     |     | 1         |
| 15   |         | QQ004011AA      |              | I.C.            | UPD4011C QUADRUPL 2-INPUT NAND GATE | U6                            |     |     |     | 1         |
| 16   |         | QQ004015AA      |              | I.C.            | UPD4015C DUAL 4-BIT SHIFT REGISTER  | U3                            |     |     |     | 1         |
| 17   |         | QQ004071AA      |              | I.C.            | UPD4071C                            | U4                            | U5  |     |     | 2         |
| 18   |         | QTA0733XCA      |              | TRANSISTOR      | 2SA733 Q,R-RANK                     | Q12                           |     |     |     | 1         |
| 19   |         | QTB0632XAC      |              | TRANSISTOR      | 2SB632 (E RANK)                     | Q2                            | Q3  |     |     | 2         |
| 20   |         | QTC0900XCA      |              | TRANSISTOR      | 2SC900 U-RANK                       | Q6                            |     |     |     | 1         |
| 21   |         | QTC0945AEA      |              | TRANSISTOR      | 2SC945A P,Q-RANK                    | Q11                           | Q13 | Q7  | Q8  | 5         |



|          |         | PART NAME       | PART CODE    |                |                   |                               |     |     |     |          |
|----------|---------|-----------------|--------------|----------------|-------------------|-------------------------------|-----|-----|-----|----------|
|          |         | P.W. BOARD ASSY | APTZZQ76AA   |                |                   |                               |     |     |     |          |
| ITEM NO. | REMARKS | PART CODE       | STOCK NUMBER | PART NAME      | SPECIFICATIONS    | SYMBOLIC OR EXPLODED VIEW NO. |     |     |     | QTY USED |
| 1        |         |                 |              |                |                   | Q9                            |     |     |     |          |
| 2        |         | QTD0313XAC      |              | TRANSISTOR     | 2SD313 C-E-PANK   | Q1                            | Q5  |     |     | 2        |
| 3        |         | QTD0545XAC      |              | TRANSISTOR     | 2SD545 F-PANK     | Q4                            |     |     |     | 1        |
| 4        |         | QTK0030ABT      |              | TRANSISTOR     | 2SK30A Y-PANK     | Q10                           |     |     |     | 1        |
| 5        |         | RD25PJ101X      |              | CARBON FILM R. | 0.25W 100 OHM 5%  | R30                           |     |     |     | 1        |
| 6        |         | RD25PJ102X      |              | CARBON FILM R. | 0.25W 1K OHM 5%   | R20                           |     |     |     | 1        |
| 7        |         | RD25PJ103X      |              | CARBON FILM R. | 0.25W 10K OHM 5%  | R23                           | R24 | R58 |     | 3        |
| 8        |         | RD25PJ104X      |              | CARBON FILM R. | 0.25W 100K OHM 5% | R49                           | R55 | R56 |     | 3        |
| 9        |         | RD25PJ222X      |              | CARBON FILM R. | 0.25W 2.2K OHM 5% | R21                           | R22 | R4  | R5  | 4        |
| 10       |         | RD25PJ345X      |              | CARBON FILM R. |                   | R46                           |     |     |     | 1        |
| 11       |         | RD25PJ472X      |              | CARBON FILM R. | 0.25W 4.7K OHM 5% | R14                           | R15 | R17 | R32 | 8        |
| 12       |         |                 |              |                |                   | R50                           | R51 | R59 | R60 |          |
| 13       |         | RD25PJ473X      |              | CARBON FILM R. | 0.25W 47K OHM 5%  | R13                           |     |     |     | 1        |
| 14       |         | RD25PJ681X      |              | CARBON FILM R. | 0.25W 680 OHM 5%  | R19                           | R31 |     |     | 2        |
| 15       |         | RD25VJ103X      |              | CARBON FILM R. | 0.25W 10K OHM 5%  | R47                           |     |     |     | 1        |
| 16       |         | RD25VJ104X      |              | CARBON FILM R. | 0.25W 100K OHM 5% | R40                           | R42 |     |     | 2        |
| 17       |         | RD25VJ105X      |              | CARBON FILM R. | 0.25W 1M OHM 5%   | R45                           |     |     |     | 1        |
| 18       |         | RD25VJ183X      |              | CARBON FILM R. | 0.25W 18K OHM 5%  | R57                           |     |     |     | 1        |
| 19       |         | RD25VJ185X      |              | CARBON FILM R. | 0.25W 1.8M OHM 5% | R61                           |     |     |     | 1        |
| 20       |         | RD25VJ335X      |              | CARBON FILM R. |                   | R38                           |     |     |     | 1        |
| 21       |         | RD25VJ4P7X      |              | CARBON FILM R. | 0.25W 4.7 OHM 5%  | R65                           |     |     |     | 1        |

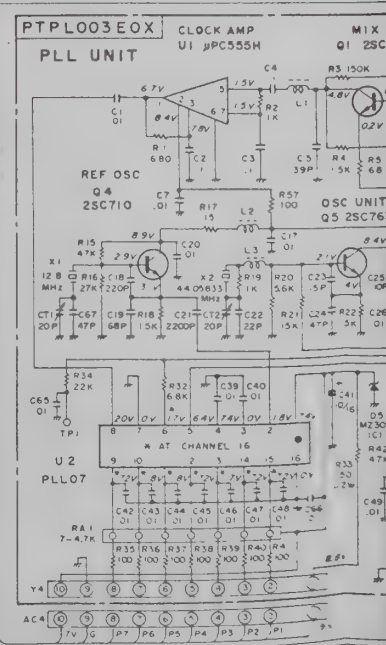
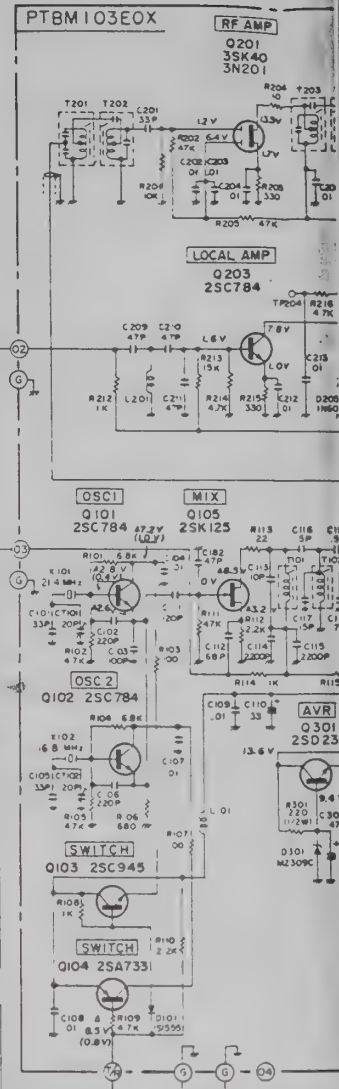
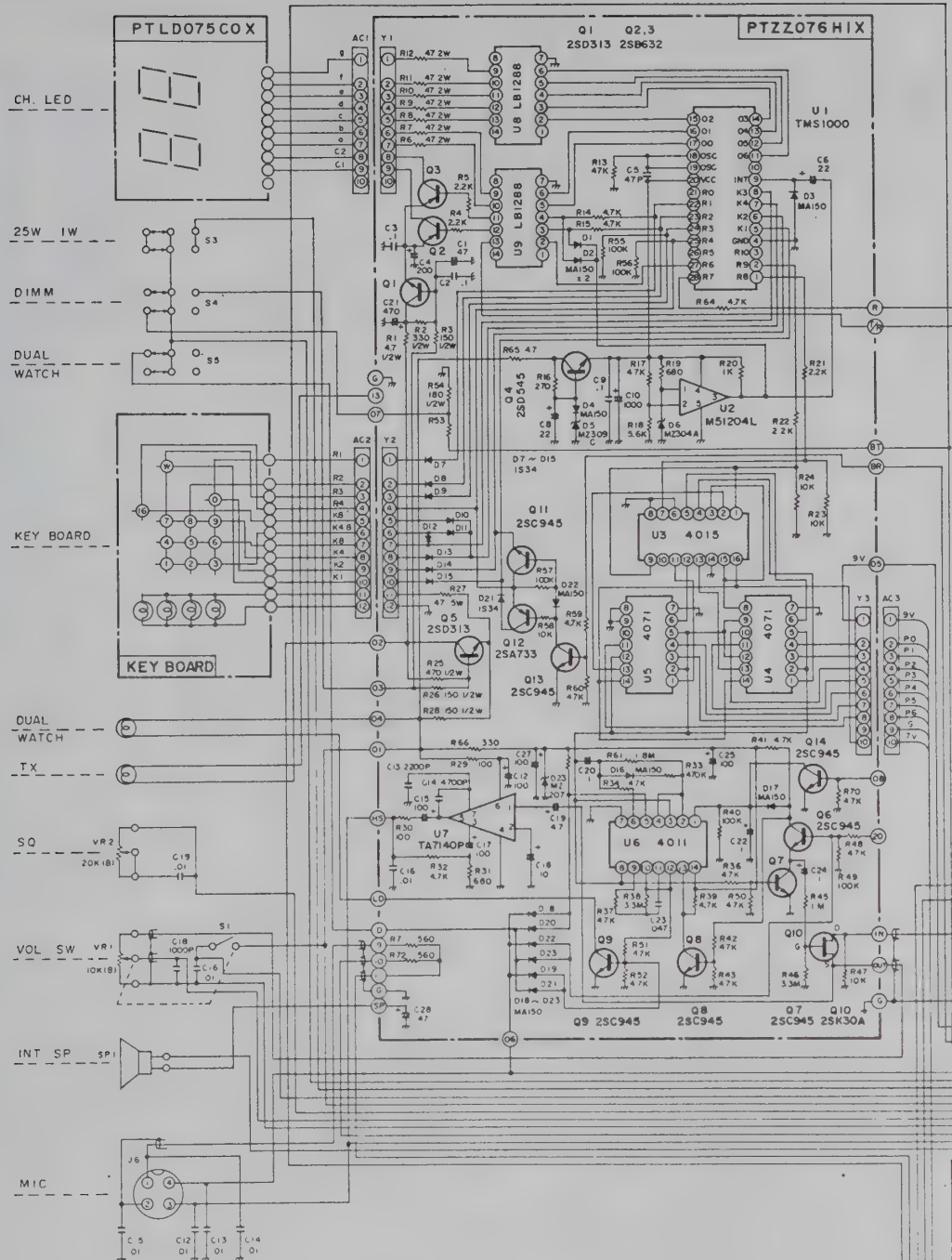


|      |         | PART NAME      | PART CODE    |                 |                |          |    |                               |     |     |     |          |
|------|---------|----------------|--------------|-----------------|----------------|----------|----|-------------------------------|-----|-----|-----|----------|
|      |         | P.W.BOARD ASSY | APTZZ076AA   |                 |                |          |    |                               |     |     |     |          |
| ITEM | REMARKS | PART CODE      | STOCK NUMBER | PART NAME       | SPECIFICATIONS |          |    | SYMBOLIC OR EXPLODED VIEW NO. |     |     |     | QTY USED |
| 1    |         | RD25VJ472X     |              | CARBON FILM R.  | 0.25W          | 4.7K OHM | 5% | R34                           | R35 | R36 | R37 | 8        |
| 2    |         |                |              |                 |                |          |    | R39                           | R41 | R52 | R64 |          |
| 3    |         | RD25VJ473X     |              | CARBON FILM R.  | 0.25W          | 47K OHM  | 5% | R43                           | R48 |     |     | 2        |
| 4    |         | RD25VJ474X     |              | CARBON FILM R.  | 0.25W          | 470K OHM | 5% | R33                           |     |     |     | 1        |
| 5    |         | RD25VJ561X     |              | CARBON FILM R.  | 0.25W          | 560 OHM  | 5% | R71                           | R72 |     |     | 2        |
| 6    |         | RD25VJ562X     |              | CARBON FILM R.  | 0.25W          | 5.6K OHM | 5% | R18                           |     |     |     | 1        |
| 7    |         | RF05SK470B     |              | WIRE WOUND R.   |                |          |    | R27                           |     |     |     | 1        |
| 8    |         | RGHANJ101B     |              | M-OXIDE FILM R. | 1/2W           | 100 OHM  | 5% | R29                           |     |     |     | 1        |
| 9    |         | RGHANJ121B     |              | M-OXIDE FILM R. | 1/2W           | 120 OHM  | 5% | R28                           |     |     |     | 1        |
| 10   |         | PGHANJ151B     |              | M-OXIDE FILM R. | 1/2W           | 150 OHM  | 5% | R25                           | R3  |     |     | 2        |
| 11   |         | PGHANJ181B     |              | M-OXIDE FILM R. | 1/2W           | 180 OHM  | 5% | R54                           |     |     |     | 1        |
| 12   |         | PGHANJ271B     |              | M-OXIDE FILM R. | 1/2W           | 270 OHM  | 5% | R16                           |     |     |     | 1        |
| 13   |         | RGHANJ331B     |              | M-OXIDE FILM R. | 1/2W           | 330 OHM  | 5% | R2                            | R67 |     |     | 2        |
| 14   |         | PGHANJ471B     |              | M-OXIDE FILM R. | 1/2W           | 470 OHM  | 5% | R26                           |     |     |     | 1        |
| 15   |         | RG1ANJ121B     |              | M-OXIDE FILM R. | 1W             | 120 OHM  | 5% | R53                           |     |     |     | 1        |
| 16   |         | RG2ANJ470B     |              | M-OXIDE FILM R. | 2W             | 47 OHM   | 5% | R10                           | R11 | R12 | R6  | 7        |
| 17   |         |                |              |                 |                |          |    | R7                            | R8  | R9  |     |          |
| 18   |         | RXHANJ4R7B     |              | M-OXIDE FILM R. | 1/2W           | 4.7 OHM  | 5% | R1                            |     |     |     | 1        |
| 19   |         | WTG510EEXX     |              | SOLID WIRE      |                |          |    |                               |     |     |     | 1        |
| 20   |         | WTG511EEXX     |              | SOLID WIRE      |                |          |    |                               |     |     |     | 1        |
| 21   |         | YJF10S002Z     |              | JUNCTION JACK   |                |          |    | J3                            |     |     |     |          |

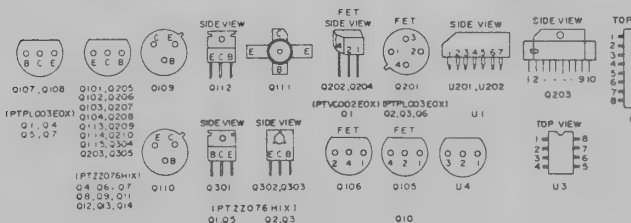


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TRANSISTOR AND IC CONNECTIONS  
(BOTTOM VIEW UNLESS OTHERWISE NOTED)

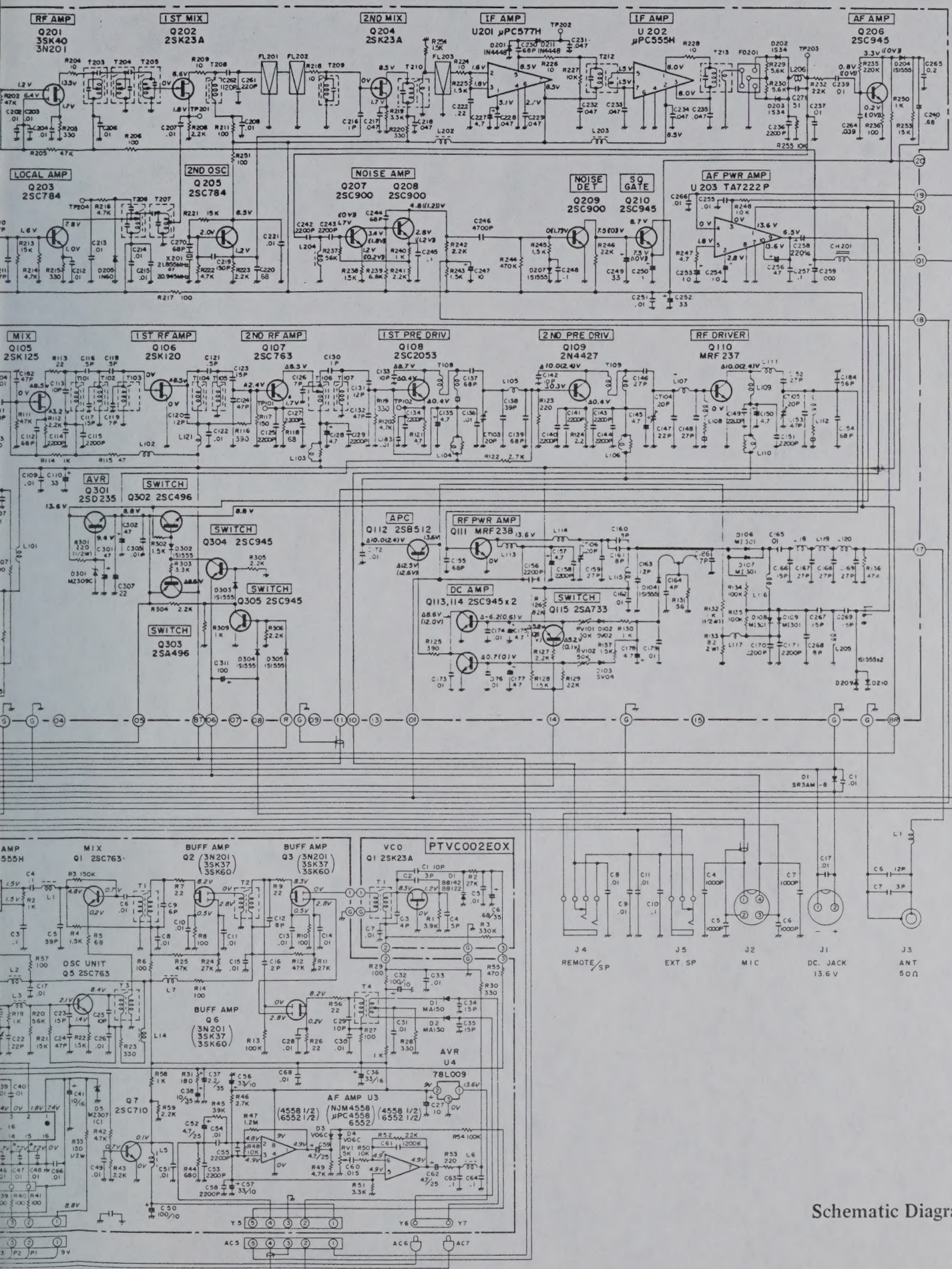


1. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE CHASSIS GROUND WITH VTVM AT NO SIGNAL.
2. CAPACITORS VALUES ARE IN  $\mu$ F UNLESS OTHERWISE NOTED. P=PICO FARAD
3. RESISTORS VALUES ARE IN OHM K=K OHM
4.  $\Delta$  AT TRANSMITTING, ( ) AT LOW POWER, ( ) AT SQUELCH OPEN









Schematic Diagram

